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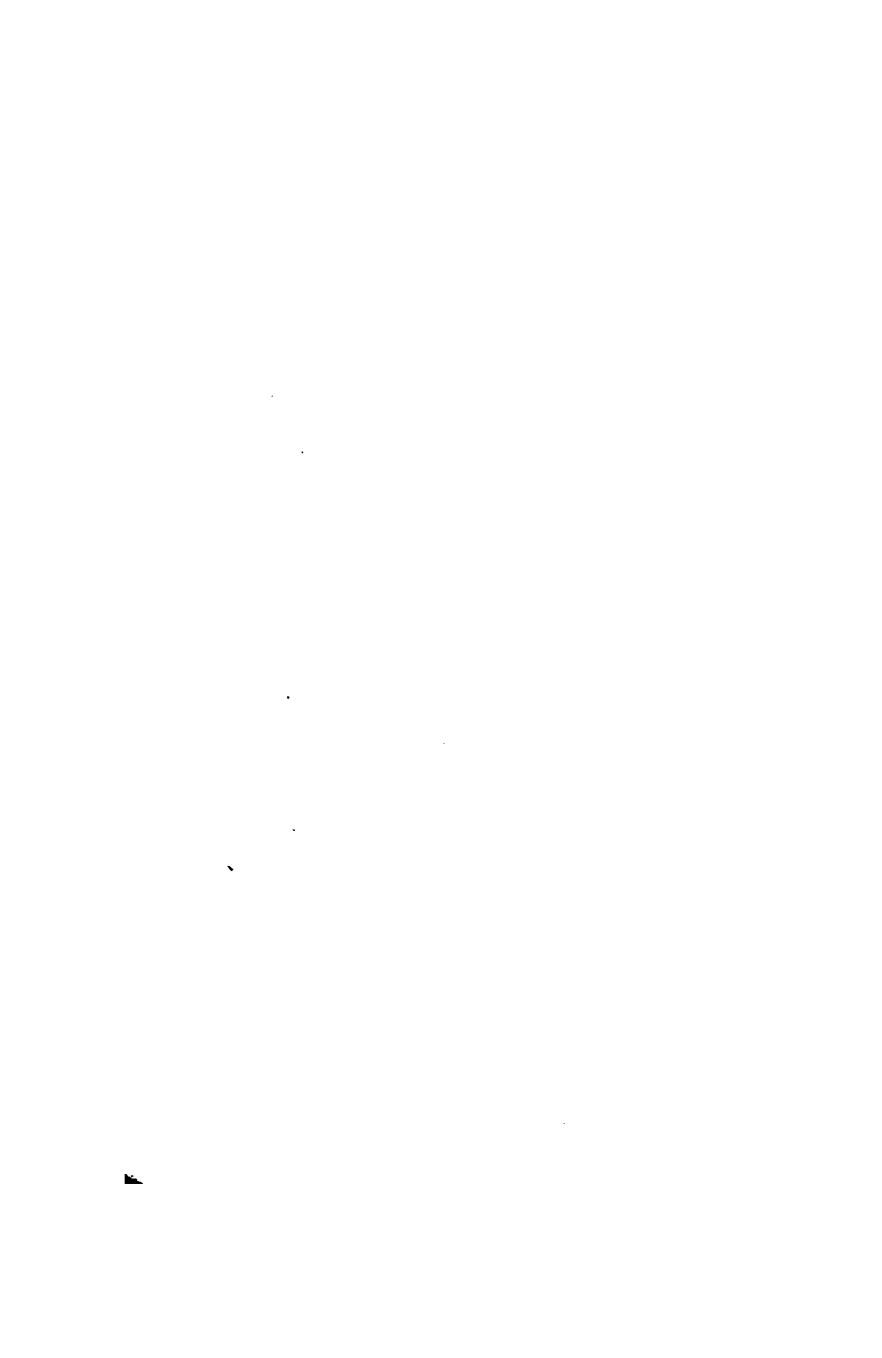
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THE EAR

IN

HEALTH AND DISEASE.

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THE EAR

IN

HEALTH AND DISEASE,

WITH PRACTICAL REMARKS ON THE
PREVENTION AND TREATMENT OF DEAFNESS.

Illustrated by many fine Wood Engravings.

BY

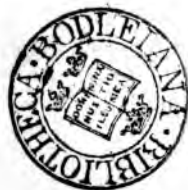
WILLIAM HARVEY, F.R.C.S.,
SURGEON TO THE ROYAL DISPENSARY FOR DISEASES OF THE EAR.

LONDON:
HENRY RENSHAW, 356, STRAND.

1854.

160. c. 27.

62



TO

RICHARD PARTRIDGE, ESQ., F.R.S.,

SURGEON TO KING'S COLLEGE HOSPITAL,
PROFESSOR OF ANATOMY IN KING'S COLLEGE, LONDON, AND
TO THE ROYAL ACADEMY,

These Pages are inscribed,

WITH

THE GRATEFUL ACKNOWLEDGMENT OF MANY
PAST FAVOURS AND SERVICES,

BY

THE AUTHOR.

AUG. 7, 1854.



PREFACE.

IN presenting to the profession this condensed view of the Ear in its healthy and diseased conditions, the author has had but one object, namely, to supply a desideratum which has been long wanted. He has been asked so frequently to recommend some treatise of moderate size and price, on the Diseases of the Ear, that the want of such a vade-mecum has long been forced on his attention. He trusts that the opportunities afforded him by several years' practice as Surgeon to the Royal Dispensary for Diseases of the Ear will present a sufficient apology for his presuming that he possesses and should diffuse some amount of practical knowledge on a subject on which he has not himself been able to meet with much assistance from books, at least so far as regards several of the more difficult points discussed in the following pages.

In conclusion, he has to thank his publisher, Mr. Renshaw, for the permission to use the beautiful engravings which illustrate the section on the function of hearing in Dr. Brinton's excellent translation of Valentin's "Physiology."

2, Soho Square,
Aug. 7, 1854.



THE EAR

IN

HEALTH AND DISEASE,

ETC.

ANATOMY OF THE EAR.

THE human ear is composed of three distinct parts,—the *external*, or visible portion, with its auditory canal or meatus—a contrivance intended to reflect into one focus the vibrations or sonorous rays of the atmosphere falling upon it in every possible direction; the *middle* portion—a bony cavity like a drum, covered on either side by elastic membranes, and designed to transmit the impulses of sound; and the *internal* portion—the seat of the sense of hearing, consisting of a number of cavities lined by a membranous texture, on which the sentient extremities of the auditory nerves are expanded.

These parts are anatomically described thus:—

The *External Ear*, or *Auricle*, is composed of several portions of fibro-cartilage covered by common integument, and is attached by muscles and ligaments to the side of the head. It is divided into *pinna* and *lobus*, the former consisting of the *concha*, *tragus*, *helix*, *anti-helix*, and of sundry cavities respectively called *fossa innominata*, *scapha*, and *fossa ovalis*—terms which serve no other use than to assist in the description of the seat of disease or of accident. They embrace that portion of the ear which projects beyond

the skull, consisting of an irregularly-formed elastic cartilaginous membrane covered by the common integument. The *auricle* issues by a root from the os temporis. It is formed of a shell-like concavity, divided and subdivided into certain spiral grooves, which all tend towards, and terminate in a central canal, the meatus externus. Of these grooves, the *concha* is the largest and deepest. Its external aspect is convex, and directly opposed to the mastoid process; its internal surface is deeply concave, and forms the entrance of the meatus externus. There are four irregular projections or eminences on its rim, to which are applied the terms tragus, helix, anti-helix, and anti-tragus. The *tragus* is the anterior projection, situated immediately behind the condyle of the lower jaw. The *helix* is a spiral projection arising from the concha, which it partially divides into two depressions. It thence rises in a curve, and forms the circumference of the ear. As it descends, it becomes less distinct, until it is lost in a soft pendulous substance, the *lobe*, the part pierced for wearing ear-rings. The lobe is occasionally the seat of disease, especially of tumours and of fatty degeneration. The *anti-helix* is a circular ridge which lies within the helix, and terminates in the *anti-tragus*, an eminence directly opposite the tragus. Anatomists describe certain muscles as originating within the auricle, which connect the various pieces of fibro-cartilage together, and move them on each other, besides those which move the ear in different directions on the head itself.

The *Meatus Externus* is a sort of funnel, terminating at the *membrana tympani*. This canal is elliptical in its form, and somewhat serpentine in its course. Its length varies from an inch to an inch and a half, by a quarter of an inch in transverse diameter; it becomes gradually narrower and smaller as it approaches its termination. It first ascends, then descends, and is again slightly bent near its extremity. Its lower part, or floor, is longer than the upper, for it terminates as it were by an oblique section, which is closed by the *membrana tympani* in such a manner, that this membrane forms an obtuse angle with the upper wall of the canal, and an acute angle

with the lower wall. The lining of this canal is continuous with the external ear, but, as it approaches the membrana tympani it is greatly altered in texture, becoming more thin and delicate, and also performing the function of a secreting membrane; as such, it is subject to many morbid affections, which are apt to be confounded together in practice. The skin of the auricle is perforated with numerous small holes, the orifices of the sebaceous follicles: the membrane lining the meatus externus is likewise similarly perforated by the ceruminous ducts. The ceruminous glands, which are about the size of millet-seeds, are placed exteriorly to the dermis of the meatus, in the interstices of a reticular membrane. The cerumen which they secrete is useful in keeping the canal of the meatus and the membrana tympani in a state of moisture.

The auricle is retained in its situation by the ligamentous connection of the cartilage with the bone of the meatus externus, and by a strong ligament that passes from an acute point of the helix to the zygomatic process of the os temporis. The human external ear seems less adapted to collect and convey sonorous vibrations than that of some other animals. The precise use of its numerous elevations and depressions has not yet been explained. Some of them seem rather adapted for the vibration of the cartilaginous structure itself than for reflecting and transmitting sound. It is certain that the acuteness of hearing with which man is blessed is fully sufficient for his wants, and even sufficient to become painfully affected by very loud noises; it is therefore possible, that the form of the ear is intended partly for ornament, and chiefly to enable the ear to detect minute variations in musical and other sounds. And this appears the more probable, as the loss of the external ear only so far disturbs the sense of hearing as to diminish the acuteness of perception.

MIDDLE EAR, OR TYMPANUM.

The tympanum is an irregular cavity, situated between the squamous and petrous portions of the os temporis, closed

externally by its proper membrane. Its length and breadth are nearly equal, being about the third of an inch. Posteriorly it is bounded by the mastoid cells, which freely communicate with each other and with the cavity of the tympanum,—of which they are therefore considered a part. They are lined, together with the tympanum, by a delicate and vascular secreting membrane: so that inflammation within the tympanum may always be considered to involve the mastoid cells, and endanger the integrity of the osseous structures.

The *Membrana Tympani* not only forms a very important partition between the external and middle ears, but it is likewise, in fact, the drum-head which receives from without the pulses of air, vibrates in obedience to the force and frequency of the atmospheric waves, and, by vibrating, communicates to the nerves of audition, through the medium of the ossicula and their attachments, the sensations which we call sound. This membrane is therefore an important part of the machinery of the ear, and too much attention cannot be bestowed upon its structure. It is placed in an osseous groove, at the termination of the external bony meatus. The membrane is oval in shape, the long diameter measuring about two-fifths of an inch. It is dry and semi-transparent. It presents a bright silvery appearance, and consists of three layers; the external, or cuticular, being a prolongation of the lining membrane of the meatus externus; the internal, also a prolongation of the lining membrane of the tympanum itself, or of the mucous membrane of the throat reflected through the Eustachian tube; and lastly, the middle layer, described by some anatomists, as Home and Blumenbach, as distinctly muscular, and by others as composed of non-muscular fibres radiating in various directions. Mr. Toynbee describes this membrane as consisting of six different layers, but his discoveries are of far too minute a character to be of any practical value. It is placed obliquely in its groove. Viewed through a proper speculum, by the light of the sun or of a good lamp, the membrane presents a greyish hue. It is traversed by

a white opaque perpendicular belt, like a narrow inverted cone, the apex of which is enlarged and slightly umbilicated: this white streak is the manubrium of the malleus. The upper part of the membrana tympani reclines outwards, so as to form an angle of 20° or 30° from the perpendicular. The membrane is described as concave externally and convex internally, but it sometimes appears almost flat. It is composed of muscular fibres, which concentrate towards the extremity of the malleus.* Internally the membrana tympani and the manubrium are covered by a reflection of the delicate membrane that lines the tympanum; externally by a reflection of the epidermis.

The membrana tympani is extremely vascular and sensitive, abundantly supplied with nervous fasciculi from the tympanic plexus, which render it sensible to the impulse of the slightest undulation of the surrounding atmosphere, and capable of conveying to the sensorium every variety and delicacy of sound. The membrana tympani closes the tympanum, and protects it from the access of external air, except through the Eustachian tube, and, by its attachment to the malleus, transmits the vibrations to the vestibule, semicircular canals, and cochlea.

In the anterior and lower part of the tympanum is placed the aperture of the Eustachian tube. This canal proceeds from the tympanum, passing obliquely forwards and inwards, and opens in the superior and lateral part of the pharynx, above the velum palati molle. The Eustachian tubes reach their termination in the pharynx with so great a degree of convergency, that if they were continued they would meet each other at the back of the vomer. These tubes are composed of bone and cartilage. The bony portion is lined with the same membrane as the tympanum, the cartilaginous with a reflexion of the membrane of the pharynx (the two being continuous with each other). The cartilaginous portion

* Mr. Wilde, speaking of this membrane, says, "There is sometimes a slight, whitish thickening, which in disease and in some old persons resembles the arcus senilis, except that in the cornea there is always a narrow clear space between the opacity and the sclerotic." The writer has not yet had an opportunity of noticing this remarkable appearance.

affords a surface for the origin of two muscles, the levator palati molliis and circumflexus palati, the action of which on this thin membranaceous portion of the tube must not be overlooked in estimating the pathology of throat-deafness. A narrow canal, partly osseous and partly membranous, runs along the upper edge of this tube, and conveys the tensor tympani into the tympanic cavity, where it acts and reacts on the malleus, and renders the membrane tense. The Eustachian tube is about an inch and three quarters in length, and its calibre varies in different portions of its course, increasing at the junction of the bony with the cartilaginous portion, until it reaches its termination in the pharynx, where it is large enough to admit a goose-quill. This should be borne in mind in the operations which may be required for the purpose of dilating the tube, and which have been too often performed in rash and reckless disregard of the form and shape, as well as of the delicate structure of this important air-conduit, and also without due consideration of the pathological changes to which it is subject.

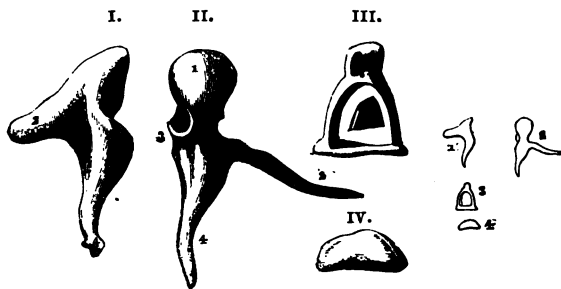
The functions or uses of the Eustachian tubes have been, and still constitute, a subject of conjecture and controversy. It is certain that if the Eustachian tube be closed, deafness results; consequently these canals have some important influence on the economy of hearing. Mr. Toynbee is of opinion that, contrary to the prevailing belief, the tubes are not habitually open, and that, so far from permitting constant and uninterrupted communication, their orifice is always closed, except during the act of swallowing, at which moment the tensor and levator palati muscles open the guttural orifice of the tube, afford free egress to the mucus secreted by the lining membrane of the tympanum, and allow air to enter or leave the tympanic cavity. Further researches are required on this intricate subject.

Besides the Eustachian tube and membrana tympani, there are two other short passages opening into the tympanum, leading the one to the vestibule, the other to the cochlea, the orifices of which are called the *fenestra ovalis* and the *fenestra rotunda*: both of them are closed by mem-

brane. A projection or shell of bone arises from the floor of the cavity, called the *promontory*: it is situate between the two fenestræ. On the posterior wall is the *eminentia pyramidalis*, from which the stapedius muscle has its origin.

The cavity of the tympanum contains four delicate little bones, called the malleus, incus, os orbiculare, and stapes. The first of these, the malleus, is divided into three portions,—the manubrium, the head, and the processus gracilis. The manubrium adheres to the centre of the membrana tympani, and may be distinguished through the meatus externus. The incus is joined to the head of the malleus at a considerable angle with the manubrium. To the incus is attached the stapes, the os orbiculare forming the medium of connection. The base of the incus fits and closes the fenestra ovalis. These bones are all articulated to each

FIG. 1.



OSSICULA AUDITUS.

I. THE INCUS.

1. The head.
2. Short crus.
3. Articulating concavity for head of malleus.
4. Os orbiculare, or orbicular process.

II. THE MALLEUS.

1. The head.
2. Processus gracilis.

3. Articulating surface for the incus.
4. Manubrium.

III. THE STAPES.

IV. OS ORBICULARE.

The smaller drawings to the right represent these bones of their natural size.

1. The incus.
2. Malleus.
3. Stapes.
4. Os orbiculare.

other by capsular ligaments, of a degree of tenuity proportioned to their minuteness: they are covered with a fine vascular membrane, from which numerous vessels proceed, which penetrate their substance, and from which these bones derive their nourishment. It will be well to bear in mind the organisation of these delicate parts. Dissection has proved how frequently they are the seat of special disease; and it cannot be doubted that deafness is sometimes caused by gouty or rheumatic action affecting these minute ligamentous structures. The ossicula appear to serve no other purpose than to give points of support for the attachment of two important muscles, the tensor membranæ tympani, which, by its action on the malleus, pulls the membrana tympani into a tense condition, by drawing the centre a little inwards,—and the musculus stapedius, the action of which on the stapes renders tense the membrane of the fenestra ovalis, and thus conveys the vibrations of the membrana tympani to the vestibule. They also form an irregular chain of connection between the external and internal ears.

FIG. 2.



THE TEMPORAL BONE.

1. Eustachian tube.

2. Tensor tympani.

3. Laxator tympani

These muscles are supplied with nervous filaments from the chorda tympani, a branch of the first division of the fifth pair, which traverses the tympanum, and then continues its course forwards and downwards, and joins the lingual branch of the inferior maxillary. This extremity of the chorda tympani is larger than that which is joined to the portio dura, whence some have considered it as a branch of the lingual nerve. This explains the course of the pains frequently suffered in ear-ache and tooth-ache. These muscles are also said to be supplied with involuntary nervous influence by special branches from the otic ganglion, besides twigs from the tympanic plexus.

The loss of the ossicula and of the tympanum itself does not destroy all possibility of hearing, although it very materially impairs the function. Hence these structures are not essential, but auxiliary.

INTERNAL EAR, OR LABYRINTH.

The intricacy of the structure of the Internal Ear, and the minuteness and rigid firmness of the bony framework which sustains its curiously-curved canals and spiral cavities, would appear at first sight to mock the anatomist and to defy description ; yet they have not only been described and delineated, but the vessels and nervous filaments of this beautiful machine have been carefully traced and described by Saunders, Soëmmering, Lincke, and other anatomists. For the purposes of this little work, a minute description of the parts would but weary the reader without serving any practical end, more especially as this well-fortified portion of the human aural citadel is inaccessible to the operations of surgery, and its physiology is only partially understood. The following outline will convey all that is important in a practical point of view :—

The labyrinth of the ear comprehends the vestibule, semi-circular canals, and the cochlea ; all of which are encased in the petrous portion of the temporal bone.

FIG. 3.



a. The meatus externus.

b. Eustachian tube.

c. Head of the malleus, resting in the irregular cavity of *e*.

e. The body of the incus.

f. The stapes covering the foramen ovale, and united with the long process of the incus.

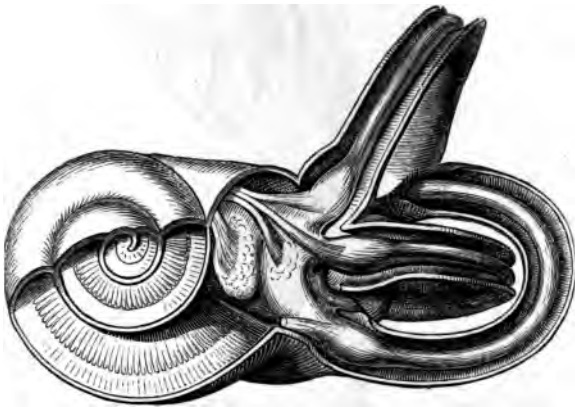
This engraving represents a magnified view of the parts: the tympanum is laid open, showing the connection of the long process of the malleus with the membrana tympani, and to the right thereof will be found the foramen rotundum, leading to the cochlea.

The vestibule is the cavity into which open the two fenestræ of the tympanum already described. It is an irre-

ularly-spherical cavity in the centre of the labyrinth ; its upper floor having a semi-elliptical, and its lower a hemispherical depression, thus forming a sort of "whispering gallery" communicating both with the semicircular canals lying in the extreme point of the petrous portion), and with the cochlea (lying towards the mastoid cells).

The semicircular canals, three in number, are placed one vertically, another obliquely, and the third horizontally. These canals, which, although called semicircular, traverse at least three-fourths of the circumference of a circle, are of very small calibre, about the size of a common pin. They open into the vestibule by five apertures only, for the smaller extremity of the vertical canal joins the smaller extremity of the oblique, and their orifice is common. The openings are of a larger diameter than are the canals, the terminations being called the *ampullæ*.

FIG. 4.



Represents the three semicircular canals, laid open, showing their formation and course, with their lining membrane and ampullæ, and the distribution of the auditory nerve through them.

The *cochlea* is a sort of winding staircase, externally like a small cockle or snail shell, and is constructed of a central pillar called the *modiolus*, on which a *spiral tube* is wound; and this spiral tube is divided into two compartments throughout its length by a septum, called the *spiral lamina*,

FIG. 5.



a. The cochlea.

t. Tensor tympani muscle.

s. Stapedius muscle.

m. Malleus.

This engraving, besides representing the cochlea, shows the tympanum laid open, with its chain of small bones; the malleus, with the attachment of the tensor tympani; and the stapes, showing that of the stapedius.

composed of two thin plates of bone. These compartments are called, the one the *scala tympani*, which begins at the fenestra rotunda ; the other, the *scala vestibuli*, which begins at the fenestra ovalis. (See Fig. 5.)

The *meatus internus* is a bony canal, about the third of an inch in length, through which passes the *auditory nerve*, which is distributed on to a membranous texture lining all the cavities above described.

The seventh pair of cerebral nerves is divided into two portions, the *portio mollis* and the *portio dura*.

The *Portio Mollis* arises from the tuberculum annulare in the ventricle of the cerebellum and the crus cerebelli. As it turns round the medulla oblongata, it is joined by the *Portio Dura*, which it partially receives in a kind of groove, and both enter the meatus internus together, being connected by a fine cellular membrane. The portio dura quits the portia mollis at the bottom of the meatus internus, and, passing through the *aquæductus Fallopii*, continues

FIG. 6.



1. Concha of external ear.
2. Tube of meatus externus.
3. Superior semicircular canal.
4. Oblique semicircular canal.

5. Horizontal and smallest semicircular canal.
6. Cochlea.

The malleus, incus, os orbiculare, and stapes are placed in situ.

its course through the stylo-mastoid canal, and is no otherwise connected with the organ of hearing than as it receives the chorda tympani, and sends twigs to the acoustic nerve in the meatus, and to the otic ganglion. The portio mollis consists of two fasciculi of nearly equal size, one of which supplies the vestibule and semicircular canals, the other the cochlea. The vidian nerve arises from Meckel's ganglion, and, together with a larger branch which unites with the carotid plexus, passes backwards into the cranium through the vidian canal to the aquæductus Fallopii: it then crosses the tympanum, emerging at the fissura Glasseri, and takes the name of *chorda tympani*. In its course it communicates with the great sympathetic in the carotid canal, the portio dura, the tympanic plexus, and the otic ganglion; after it has quitted the internal ear, it unites with the gustatory nerve, and afterwards with the submaxillary ganglion. The *otic ganglion*, discovered by Arnold, is a small, soft, reddish body, immediately below the foramen ovale, in front of the great meningeal artery, and between the third division of the fifth and the Eustachian tube. It is a sympathetic ganglion, and is connected by twigs with the superior maxillary, the tympanic plexus, the chorda tympani, and the first cervical ganglion of the great sympathetic, besides which it supplies several muscles connected with the organ of hearing with nervous power. The tympanic plexus, already noticed, is composed of twigs from the sympathetic, the otic ganglion, and the chorda tympani. The ear, externally and internally, is supplied with blood by branches from the external and internal carotid and from the basilar: the internal auditory arises from the last-named vessel. The veins and lymphatics accompany the arteries in their course.

The precise use of the semicircular canals is not yet understood, although it cannot be doubted that they assist in conveying or strengthening the sonorous impulses. Beyond this, their curious irregularities must remain a mystery. But should the economy of this beautiful mechanism appear to the philosophical mind so intricate and involved

as to soar above all human comprehension, let it be remembered, that even this exquisite organisation conveys only a faint idea of INFINITE WISDOM.

FIG. 7.



THE EAR, EXTERNAL AND INTERNAL.

- | | |
|---|---|
| a. The helix. | 8. Superior or vertical semicircular canal. |
| b. The anti-helix. | 9. Horizontal ditto. |
| c. The scapha. | 10. Internal or oblique ditto. |
| d. The tragus. | 11, 11, 11. Scala vestibuli, with its two turns and a half. |
| e. The anti-tragus. | 12, 12, 12. Scala tympani, with its two turns and a half, both scalæ terminating in the cupola. |
| f. The lobe. | 13. Meatus auditorius internus. |
| 1. Meatus externus. | 14. Eustachian tube, terminating in the tympanum. |
| 2. Membrana tympani. | 15. Chorda tympani, passing out from the fissura Glaseri. |
| 3. Malleus. | 16. Styloid process. |
| 4. Incus, connected with the os orbiculare. | 17. Portio dura. |
| 5. Fenestra vestibuli, closed by the stapes. | |
| 6. Fenestra cochleæ, the termination of the scala tympani. | |
| 7. Vestibule, with the openings of the semicircular canals. | |

A little reflexion on the minute and curious structure of the internal ear will serve to make it plain that the diseases of these parts are not amenable to manual operations; but it does not follow that their morbid conditions are beyond the reach of medical treatment.

PATHOLOGY OF THE EAR.

ON THE CAUSES OF DEAFNESS.

THE pathology of deafness, and of other morbid affections of the organs connected immediately or remotely with the economy of hearing, has long been veiled in very considerable obscurity. The complicated structure of this beautiful mechanism has, however, presented difficulties more formidable in appearance than in reality, to the study of the functional derangements as well as of the organic lesions to which it is exposed. "The causes of loss or imperfection of hearing," says Mr. Saunders,* "are involved in the greatest obscurity;" and he adds, that we are almost destitute of information concerning "the morbid changes to which the ear is liable." Since his time diligent investigations have been made into the morbid anatomy of the ear, but without a corresponding discovery of the indications presented by each case for the particular treatment it may require; thus affording a fulfilment of the prediction made by Mr. Saunders half a century ago, that "It would not suffice if anatomy were able to develop every morbid alteration of structure of which this organ is susceptible. A great object would indeed be gained, but a greater would still remain unaccomplished." The following observation of this enlightened surgeon, not less prophetic in its way, will tend to show in what direction we must chiefly look for all future improvements in the science of aural therapeutics. After speaking of the impossibility of curing the defects of the internal parts of the ear by manual operations, he says:

* "The Anatomy and Diseases of the Ear," 1806.

"It by no means follows that such cases are irremediable. Many morbid changes of the vital organs of the body, equally inscrutable as the ear, in the living subject, are, when we know the symptoms indicating their existence, successfully treated by the operation of internal remedies, and I have no doubt that deafness, in various instances, depends on morbid changes which are curable by the general treatment of the constitution." This, in fact, is the great principle on which a large proportion of the cases of imperfect hearing may be most successfully managed. Nervous deafness, so called, is too often regarded as a weakness or defect of the auditory nerves, whereas it is frequently dependent upon some latent disorder of the general health, not always complained of by the patient, but which will readily yield to medical treatment, as will with it the local defect in hearing.

It often happens, indeed, that these constitutional lesions are manifested by symptoms well defined, yet often disregarded by the patient. For instance, long-continued and intense headaches, from close mental application or from other causes, accompanied with noises in the ears, such as singing, ringing of bells, beating of drums, rustling of leaves, the noise of the sea in a gale, the boiling of water in a tea-kettle, a succession of harmonic chords, or even the melody of a favourite and familiar air, and every other conceivable natural sound ; such are frequently the precursors of nervous deafness, which, in many instances, might be avoided by timely and judicious treatment of the premonitory symptoms. In other cases, deafness is ushered in by long-continued dyspepsia, nervous irritability, gouty and rheumatic conditions of the system, catarrhal affections of the throat, and, more frequently than all, by scarlet fever in its more severe forms. Besides these very frequent causes of deafness, many cases present themselves clearly of scrofulous or syphilitic origin : others are hereditary, and a few appear to originate only in that senile decay of the nervous power, which also impairs the sight, the memory, and the

other faculties in advanced life. Another not unfrequent cause of deafness may be found in a disposition to eruptive diseases of a chronic character. These become either a direct cause of deafness, by affecting the meatus externus, or by their discharges, under negligent mismanagement, being allowed to fill up the canal; or indirectly, by the retrocession of severe eruptions affecting the scalp, the patient suddenly becomes deaf, complaining, at the same time, of giddiness, dimness of sight, &c. Lastly, to quote the graphic language of Kramer, "Depressing mental affections, grief, care, melancholy, violent terror, &c., act much more permanently, and in a far more decidedly injurious manner, on the vital power of the auditory nerve, and thus give rise to the most obstinate cases of nervous deafness."

We must not omit here to notice in passing, that melancholy condition too often met with in children, whose hearing, from defective organic conformation, either congenital or of infantile origin, has been totally destroyed, or so far impaired that speech is either never acquired at all, or, having been acquired, escapes by degrees from the memory, leaving the subject a daily-diminishing vocabulary until absolute dumbness ensues.

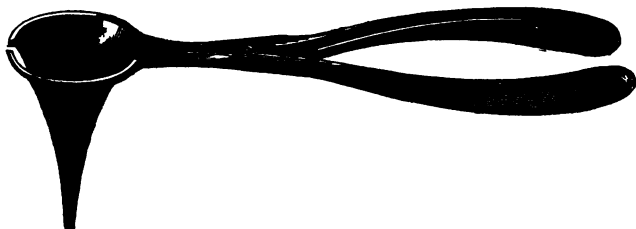
It is needless to insist upon the necessity of careful discrimination in the study of an infirmity depending upon so great a variety of causes and conditions of the frame. The importance of distinguishing functional or sympathetic deafness from organic disease of the ear, not less than the necessity of tracing functional deafness to its true constitutional cause, are too obvious to require further comment. In order that the practitioner may be in any degree successful in restoring the lost hearing to a patient, it is indeed necessary that a much more systematic and searching method of investigation should be set on foot, than has commonly been the practice hitherto.

ON THE MODE OF INVESTIGATING AND DIAGNOSING DISEASE
OF THE EAR AND DEFECTIVE HEARING.

The first thing to be done in this inquiry is, to ascertain the history of the disease, the length of time it has existed, the circumstances under which it first attacked the patient, the state of the general health at that period, and since then, to take into account the temperament, constitution, age, and sex of the patient, and his or her employment and habits of life. Next, we inquire whether one or both ears be affected; and then proceed to the examination of the organ itself.

We first examine the auricle, and observe whether it be normal in figure, colour, temperature, and thickness, and whether it be well placed; next, whether it be affected with cutaneous disease at present, or had been so affected formerly. With this object in view, the space immediately below and behind the lobe of the ear should be carefully examined, and the infra-zygomatic region may also be explored. We then proceed to the examination of the meatus externus, and with it of the membrana tympani. This constitutes a most important part of the investigation, and in order to its efficient performance, it is necessary that the surgeon should supply himself with the *speculum* here figured.

FIG. 8.



This instrument is bivalved, and possesses a great advantage over the specula in common use; 1st, by its large disk,

which throws more light into the canal, and allows room for the application of escharotics, &c. to the membrana tympani and the walls of the canal ; 2ndly, by its double blades, by the separation of which the cartilaginous portion of the canal can be dilated, even while there exists a considerable amount of disease in it.

Inspection of the Membrana Tympani.—The speculum having been introduced, and the rays of the sun or of a lamp having been thus thrown upon the membrane of the tympanum, we may now discover whether there be any wax or morbid secretion in the canal requiring removal ; and we may likewise observe the condition of the mucous lining of the canal. If the inspissated wax, detached cuticle, or other mechanical impediment, such as foreign bodies, be comparatively small in quantity, and not sufficient to cause a complete obstruction, nor be apparently the cause of the loss of hearing, they should be removed gently by a pair of fine forceps, as the act of syringing, which otherwise it would be necessary to have recourse to, would tend greatly to increase the vascularity of the lining membrane, and thus mask the amount of existing disease, and lead perhaps to an erroneous diagnosis. Next we examine the membrane of the tympanum, and observe—1, its colour, which, in the normal condition, is of a greyish hue ; 2, its degree of transparency, which ought to enable us to observe the direction and projection of the manubrium of the malleus ; 3, its vascularity, which, if excessive, will be easily detected ; 4, the form of its surface, whether convex, plane, or concave ; 5, its tension and flexibility ; 6, whether it be pervious or impervious, which can only be ascertained with certainty by inflating the tympanum through the Eustachian passage, when, if the membrane be perforated, a loud whistling noise will be heard rushing through the aperture, the open everted edges of which will sometimes be moistened with a mucous discharge. It must be remembered, however, that, if the Eustachian tube be blocked up from disease, this inflating process cannot be effected, even although the membrane be perforated. It should not, how-

ever, be hastily concluded that the tube is blocked up. Indeed, that can only be ascertained by the application of an instrument of a peculiar construction, called the Otoscope, applied so as to enclose the whole auricle,

FIG. 9.



when, if the Eustachian passage be open, and the membrane imperforate, a peculiar crackling sound of a delicate character will be heard, produced by the air rushing into the tympanum, which is also perceptible to the patient. If this sound be not heard, it may become necessary to pass a catheter through the Eustachian tube, but with the reserve and precautions to be hereafter noticed, and *not for the mere purpose of diagnosis.*

The next step in the investigation is, the *examination of the throat*—the mucous lining, whether follicular or otherwise; the tonsils, whether enlarged, inflamed, or ulcerated; the uvula, whether relaxed or elongated; notice should also be taken of the voice of the patient, whether normal, or partaking of the peculiar nasal tone which indicates a thickening of the membrane in the posterior nares.

The *hearing distance* in both ears is the next thing to be enquired into. This is best ascertained by the watch, which should be applied not only to the ear itself, but in front of and behind the auricle, to the forehead and the temporal bone, and also between the teeth. It should be used also as a test of hearing before and after the inflation of the tympanum by the Eustachian tube.

Lastly, the examination of the *mastoid process* should never be neglected, inasmuch as some secondary mischief may have been established in that locality as the result of tympanic disease, or of long-existing discharges. Its size, shape, and temperature, and the colour of its integument should be noted, and we should observe particularly whether there be any fluctuation, tenderness, or pitting on pressure over the bone or in its immediate neighbourhood. This part of the middle ear is often diseased for years in children without its being recognised, and consequently it is neglected until serious mischief has ensued.

The diagnostic signs conveyed to the practitioner by the observations recorded in the preceding paragraphs, will be fully explained as we proceed to describe the particular diseases of each structure ; but it was thought necessary to bring into prominent notice this method of examination as essential in all cases where the hearing is defective or the organ diseased. Nor is it less important to impress upon the mind of the practitioner, that, as a general rule, here his investigation should end. Some surgeons, it is true, are in the constant habit of passing a catheter into the Eustachian tube to ascertain if it be pervious. The author cannot too severely condemn a practice which is rarely necessary for diagnosis, and which is at best fraught with danger in hands unaccustomed to its use, and more especially if there be any inflammation in the tympanum or of its membrane, or again of the tube leading from the throat to the tympanum, through which the operation of catheterism is to be practised. If such a disease should exist, whether it be acute or chronic, mild or severe, it must be self-evident that the operation in question, however skilfully it may be performed, cannot fail to be very injurious. Mr. Wilde, in his recent work, speaking of the use of the Eustachian catheter, confirms the opinion advanced by the author in a paper read before the Medical Society of London in 1849 ; he says, "I have latterly found it very seldom necessary to resort to this operation, as the cases in which it is applicable are of much greater rarity than

is usually supposed, or as the works of aurists would lead us to believe." And such, we are inclined to consider, is the now usually-received opinion of the educated surgeon-aurists of the present day. Like many other remedies, or rather alleged remedies, for nearly intractable diseases, when its use was revived of late years, it was launched forth on the current of professional opinion, and soon attained a high repute as a mechanico-surgical means for removing the most obstinate and protracted cases of deafness. The feasibility of the theory, that most cases of loss of hearing had their origin in the obstruction of the Eustachian tube preventing the access of air to the tympanum, aided it greatly in obtaining a *locus standi* among the operative means for the cure of deafness; and it needed a large and lengthened experience to demonstrate that the cases really admitting of relief by this means were few and rare, and that in these few cases the operation alone could not effect a cure, constitutional remedies and hygienic measures being also requisite to assist, and even modify its action.

In diagnosing the causes of deafness there are certain prominent symptoms of very common occurrence, which authors have occasionally been tempted to speak of as though they were themselves diseases, or conditions of disease, requiring special treatment, and curable without reference to the causes by which they were produced, or the diseases of which they are merely symptoms or indications. Of these symptoms, *tinnitus* (or noises in the ears), *otorrhœa* (a term applied indiscriminately to all discharges from the meatus), and *otalgia* (or ear-ache), are the most prominent. A few remarks on each of these, as symptoms, may not be altogether out of place.

TINNITUS.

The causes of *tinnitus aurium* have been a source of contention with aurists from the days of Hippocrates, and the moderns are scarcely less divided in opinion than

the ancients. Time was, and not long since, when the symptom was taken to be diagnostic of some existing lesion; but more recent observation proves that it is generally induced by a species of hyperæsthesia, or morbid irritability of the auditory nerve, by which sounds are heard which do not exist, by-gone melodies are re-echoed to the brain, and the patient is harrowed and sometimes tortured with a pseudo-phonous chorus, which absorbs or disturbs his attention in a most annoying degree. This unpleasant symptom may arise from any of the numberless causes which affect the healthy functions or damage the structure of any of the parts concerned in hearing. The brain itself may be the seat of this disorder; and as visions and apparitions disturb the imagination in delirium and insanity, so sounds proceeding from no outward source are heard and described by the patient in glowing terms. The branches of the auditory nerve, as expanded in the recesses of the labyrinth, may, therefore, be the seat of this morbid affection, from some lesion in their own structure or some congestion in their investing membranes, as also the bony cavities which they traverse. Further, the tympanum or its ossicula, or the Eustachian tube and its membrane, the membrane or fenestræ of the tympanum, the mastoid cells, or the external meatus,—any or all of these, as they may in a state of disease render the brain insensible to external sounds, may also, under different morbid affections, materially augment the sentient force of actual sounds, much to the distress of the patient, and plague him with mimic vibrations which have no reality in the surrounding atmosphere. These sounds may likewise arise from constitutional causes, or lesions of remote organs,—thus, dyspeptic, hysterical and gouty patients, to say nothing of the hypochondriacal, are occasionally haunted with every conceivable kind of noise: the whizzing of a bullet—the rustling of leaves—the roar of a distant water-fall, or breakers on the shore, or boiling of a tea-kettle—the beating of drums—the discharge of musketry or artillery—the melody of some familiar air,—all these, and ten times as many more varieties of sound, are

described, both by nervous and deaf patients, as very common sources of annoyance. How, then, can tinnitus be symptomatic of any one particular disease, seeing it is common to all? And yet the assumption of some diagnostic indication thus conveyed has been a ground of practice scarcely less injurious than empirical. In fact, there is no symptom concerning which a greater amount of quackery has been written and perpetrated, and none that requires greater vigilance on the part of the practitioner. It is sometimes attended with deafness, at other times the hearing is morbidly acute: sometimes it is referred to the head, sometimes to the ears, or perhaps to only one ear: it may attack the patient gradually, or it may seize upon him suddenly, and continue for years. In some it produces melancholy, haunting them day and night; in others, who are perfectly deaf, it seems somewhat to compensate for the affliction, becoming rather a pleasing illusion, echoing the melody of some favorite air which had been forgotten long before. One loyal patient expressed to the author the pleasure he experienced in hearing the national anthem during the whole of the morning, while his evening hours were solaced with the more "allegro" movement of "Rule Britannia." On the other hand, the reverse may be the case, and patients incurably deaf may still seek for relief from the distressing annoyances to which they are subjected by the persistence of this unpleasant symptom.

It follows of course, that tinnitus of whatsoever character must be taken as a symptom of deranged function, as well as of structural changes, arising from a great variety of conditions in various tissues, and should only be regarded diagnostically in connection with other symptoms.

In one point of view tinnitus presents itself as a symptom indicative of one of the most serious maladies to which the human frame is subject. We allude to those cases where it is complained of as occurring within the head, where it is accompanied by other symptoms diagnostic of cerebral disease, and where it is one of the precursors of apoplexy, *ramollissement* of the brain, or palsy. If the warning thus

given be neglected, the most serious consequences may, and probably will, ensue. In such a case, the general or constitutional signs and symptoms should be taken fully into account, and the treatment guided by principles founded on the past and present history of the case.

OTALGIA.

Otalgia, or Ear-ache—that is, pain, more or less acute, in any part of the organ of hearing, whether it be constant or intermittent, whether transient or persistent, is not a disease *per se*, and can only be regarded as a symptom that may accompany almost every conceivable morbid condition of the various structures that compose the ear and its appendages. As, therefore, it cannot be looked upon as a disease in itself, it becomes necessary carefully to investigate the attendant symptoms, to inquire into the history of the case, and to ascertain fully all the circumstances connected therewith, in order that its origin may be clearly defined, whether it depend on irritation or inflammation, or whether it be of a neuralgic character, as its treatment on rational principles must necessarily depend on the causes which induce it. The severity of the pain may be said, in some measure, to be an indication of the amount of mischief on which it depends, when it is also persistent, without any intermission, as thus it indicates an inflammatory condition of the parts concerned. On the other hand, intense suffering, if intermitting, or rather occurring at regular and stated intervals, and continuing for a given time, may be considered as a symptom of nervous otalgia, or neuralgia of the auditory nerves or chorda tympani, whichever nerve it be that is the seat of the disorder. The existence of this last-named form of disease has been questioned by some writers on the diseases of the ear, and by others admitted, but only as of very rare occurrence; nevertheless, those who have attentively and studiously inquired into aural nosology, can hardly admit of a doubt respecting the occurrence of this variety of neuralgia. The symptoms

we have mentioned, the intensity and regularly-intermittent pain, unattended by inflammatory action, are signs indicative of neuralgia only, nor does there appear to be any valid reason why the nerves connected with the organ of hearing should not be liable to neuralgia, while nerves in other parts of the frame are subject to that disease. Nervous otalgia, when it does occur, is generally accompanied by, or connected with, some other derangement of the frame; in young females, it may be met with as a symptom accompanying hysteria or some other uterine derangement; dyspepsia, or disordered condition of the hepatic function, may induce an attack; and again it may depend on the presence of the arthritic or rheumatic diathesis. It is found sometimes in combination with *hypercæmia*, or to use a term commonly employed by our French brethren, an intense exaltation of the auditory function,* a condition frequently met with in cases of fever, and also in other affections of the nervous system, in which neuralgic pains are generally complained of elsewhere; it has also been found to alternate with other forms of the same disease. M. Andral mentions a case in which otalgia alternated with sciatic neuralgia; and it has been frequently observed that neuralgic pain on ceasing in the ear has shown itself in the face, and shortly afterwards has recurred in its former site. It not unfrequently occurs in females during the early months of utero-gestation, and is often concomitant with odontalgia, even where caries does not exist. The occur-

* "Great acuteness of hearing occurs occasionally as an idiopathic affection in nervous and highly-irritable individuals; it bears a striking analogy to that irritability of sight which is occasionally met with. The external senses, especially those of hearing and sight, strangely sympathise with each other. The increased acuteness of hearing depends upon a morbid excitement of the nerves, sometimes of the whole of the auditory organs, but more generally of some particular part, as of the tympanum, or the labyrinth. In most instances it seems confined to the branches of the nerve. It is associated frequently with ear-ache, head-ache, and acute pains along the jaws, which are generally periodical and rheumatic. The sensation is sometimes so keen as to render whispering, or a mere current of air in a room, or the respiration of persons present quite intolerable, while noises before too slight to be perceived or noticed become highly distressing."—Harvey on "Rheumatism of the Ear and Head," p. 33, Renshaw.

rence of neuralgic pains affecting the ear, as a symptom of a painful carious tooth cannot be doubted by even the most careless observer, as it is one of the most ordinary forms of suffering under these circumstances.

In cases of severe otalgia, there is great constitutional sympathy, arising from the intimate communication existing between the different branches of the fifth, such as the gustatory, the dental, and the auricular, with the sympathetic, the portio dura, the glosso-pharyngeal, the pneumogastric, and accessory nerves. The diagnosis between this disease and otitis, whether it be rheumatic or idiopathic, is, that in otalgia the pain comes on suddenly, often remits, and, during the intervals, the patient is perfectly free from pain; but, upon the return of the paroxysm, the pain is again excruciating; there is also an absence of throbbing; whereas in otitis the pain gradually increases, is continued, and attended by a sensation of violent throbbing. Sometimes the pain is confined to one half the head, sometimes over the nose, and it is of a dull agonizing kind rather than really acute; and though the pain in this complaint does not increase in severity, as in the last-named disease, yet it varies in degree, coming on at times in very severe paroxysms, and recurring with great violence when the head is bent downwards. Sometimes the pain is excited by merely touching the scalp, or by using the comb to the hair; the patient is generally unable to rest his head on the affected side.

The seat and the character of the pain are diagnostic signs in the rheumatic variety. Generally the chief seat of pain at the commencement is in the head, where it is complained of for some time, after which it extends towards the ears, attended with a disagreeable buzzing and tinkling sound, and a benumbing sensation involving the ear and temple: the pain next attacks the eye-ball and brow, and passes downwards to the jaws and teeth, very much resembling in its progress an attack of *tic-douloureux*.

The author has very recently attended a case of this severe affection, attacking the left ear; it had been com-

plained of for upwards of twelve months; he had the opportunity of examining the ear during a paroxysm, but nothing could be discovered satisfactorily to account for the intense agony; not a vestige of inflammatory action could be ascertained; the external meatus was moist, and the ceruminous circle perfect. On directing attention to the teeth, both the dens sapientiæ and first molar were tender, and were extracted accordingly; after which the pain ceased permanently.

OTORRHŒA.

A discharge of purulent or sero-purulent matter from the meatus externus may result from various causes and conditions within that passage. Like tinnitus, it is not a disease *per se*, nor is it diagnostic of any special malady of the organ of hearing. Still its presence naturally suggests an attentive and close examination of the meatus and membrana tympani. It may consist only of an excess and a morbid alteration of the natural secretion of the follicular structure of the lining membrane of the canal itself, or of the ceruminous glands. It may likewise result from suppuration in the meatus, from granular growths, polypi, or other morbid conditions of that passage; or the discharge may be the consequence of an abscess in the tympanum perforating the membrane, or, more rarely, of the membrane itself, with or without disease of the bony structure. Most or all of these affections may arise from various causes, such as dentition in children, the strumous diathesis, porrigo, crusta lactea, herpes, &c., catarrh, rheumatism or gout, fevers, illnesses of long continuance, metastasis from purulent ophthalmia, erysipelas, scarlatina, and other exanthemata or eruptive diseases, neglect of cleanliness, violent use of the syringe, the presence of foreign bodies in the ear-passage, mechanical injuries, &c. It is clear, therefore, that the treatment of otorrhœa must resolve itself into the treatment of the disease, whatever it may be which, upon a careful investigation, shall prove to have been its proximate

cause, and no rule, with the exception of that of strict cleanliness, can apply to every case. It is equally clear that this symptom should never be neglected, or treated as a lesion which will right itself without medical aid. The longer the duration of the evil, the more difficult it is to remove it.

Otorrhœa is, perhaps, one of the most common signs or symptoms attendant upon diseases of the organ of hearing. It has been already shown that the causes which may produce it are very numerous and very varied in their character and degree of severity and danger. It may, and frequently does, arise from causes so trivial, from inflammatory action in the meatus so slight and apparently unimportant, that the patient does not experience any pain or sensation of uneasiness prior to the secretion of the discharge, so as to enable him to trace the otorrhœa to any cause, or to affix a date to its commencement: on the other hand, the disease causative of the otorrhœa, and the accompanying symptoms, may show an intense degree of severity in the inflammatory action, and a considerable amount of danger *ab initio*; or, again, it may vary and present any amount of severity between the two extreme points of almost innocuity, as regards its origin at least, and of great danger and suffering. There is another point also, respecting which there may be a great variance in this malady; the otorrhœa, which, at the commencement, showed but little inflammatory action as its cause, and was unattended by any sign of uneasiness other than its own existence, if it be grossly neglected, and the ear-passage never cleansed from the constantly-accumulating secretion, may gradually excite a higher degree of inflammation in the surrounding tissues than existed at the time the discharge first made its appearance, especially if the patient be the subject of the strumous diathesis; the condition of the lining membrane of the meatus and of its ceruminous glands may be changed, the membrane of the tympanum may also be gradually involved in the disease, a low degree of inflammation extending to its surface, constantly bathed in pus, ulceration

may ensue, followed by loss of the *ossicula auditus*, and more or less extensive caries of the bony structure of the internal ear may be the result ; or, again, the otorrhœa, which at the commencement showed high inflammatory action, being caused by mechanical injuries, by the irritation of dentition, or by the repercussion of cutaneous maladies, may nevertheless not be of long duration, and may disappear without leaving a trace behind, to show that the ear and its passage had been the seat of a malady which might, and frequently does, prove harassing, obstinate, and destructive.

For all these reasons, then, although the discharge from the meatus will be duly noticed and commented on in the future pages of this volume, when dwelling on the different diseases of which it is respectively a symptom, nevertheless it is advisable, and, perhaps, convenient to give a brief and summary sketch of it in this place, more especially as it has often been looked upon as if it were itself a disease, instead of being a symptom common to many diseases of the ear, whether acute or chronic.

The discharge from the meatus may, in the first instance, appear to be muco-purulent, but this, under the continued influence of the inflammation which caused it, will gradually change, and assume the true characters of purulent secretion ; or these, again, may show themselves as soon as the discharge first appears. The signs presented by the secretion will vary from those of the true laudable pus described by surgical writers, according to the nature of the cause exciting the discharge, the severity of the attendant inflammation, the character of the diathesis, and also according to the structures that are involved in the disease.

The discharge in cases of otorrhœa may be quite as variable as the nature of the causes that produce it. In some it may be thin and watery, mixed with flocculent flakes or portions of inspissated cuticle, greenish, yellowish, stained with blood, or deeply mixed therewith, inodorous, offensive, or even absolutely fetid, the latter especially being the case when the otorrhœa has been of long continuance, and

the discharge, from great neglect of cleanliness, &c., has been allowed to collect in the meatus, or when the bony structure of the ear is involved, and caries is making progress. It rarely happens that the discharge presents the characters of true, laudable pus. In some few cases it may persist during life, unattended with pain, and without causing any inconvenience or disturbance in the system. Yet more rarely, it has been found not to have caused any imperfection in the hearing distance.

During the period of dentition in some children, it is not uncommon to find otorrhœa present during the cutting of each tooth, subsiding as readily after the tooth has made its way through the gum : while in others it will be persistent, until a change of constitution, such as the occurrence of puberty, has taken place. The discharge is often scanty at one time, and copious at another ; it may even disappear for a time, but this disappearance must be looked upon with caution, as it seldom happens without setting up some serious disturbance or derangement of other organs, which will be the more dangerous if the patient be of the strumous habit ; it may then occur as a metastasis to the brain or the glandular system, and will require active depletion, with decided counter-irritation applied to the organ of audition or to its neighbourhood, so as to re-induce the otorrhœa, or to set up an equivalent purulent secretion, and thus to restore the balance in the system. It is not uncommon to find the sudden suppression of this discharge accompanied, or rather rapidly followed by, paralysis of the face, a symptom, by-the-by, not rarely met with in cases of otorrhœa where there is caries involving the tympanum, and consequently the chorda tympani nerve. In those cases where the otorrhœa has been suddenly suppressed, the headache and paralysis are generally preceded by other well-marked symptoms of cerebral mischief for some time previously. Many cases are recorded by M. Lallemand of otorrhœa alternating with rheumatism and catarrh of the bladder ; the writer has been consulted on two cases where it suddenly became suppressed subsequent to matrimony, severe

head symptoms indicating the cerebral excitement which was consequently induced. In neither of these cases was there the slightest morbid alteration in the structures of the ear, although the otorrhœa had continued in one case (that of a female) for nineteen years, and in the other (that of a man) for upwards of fifty. In the last-mentioned case it had first shown itself in childhood.

The form of otorrhœa which is the result of cold-bathing is generally difficult to remove; particularly if the habit be scrofulous. When the discharge in otorrhœa is purulent or stained with blood, it assumes a more serious aspect, and no case should be permitted to remain without due medical attention, as under these circumstances it may be considered that the disease has advanced so far as to affect the bony parts of the organ; or that the tympanum itself, with its contents, is implicated. The patient complains of severe pain in the ear and over that side of the head, and has a dull, heavy expression: caries is in these instances present, and should be looked upon as a very grave complication, more especially as regards its results, if it remain uncontrolled by medical care.

The progress of caries affecting the middle and internal ears is usually slow, although in some cases, when the inflammatory symptoms run very high, with violent fever and general disturbance of the health, it may spread much more rapidly through the bony textures, and speedily involve all the osseous structures engaged in the function of hearing, as well as the remaining portion of the temporal bone, and extend thence to the meninges, and subsequently to the brain itself. When the bones are about to be attacked by caries, the membrane of the tympanum is first destroyed, wholly or partially, by ulceration, and the small bones forming the chain of connection between the middle and internal ears come away with the discharge, which is thin, dark coloured, stained with blood, and very offensive; the osseous parietes of the meatus externus and of the tympanum become perforated by caries, the disease in the latter affording a passage for the morbid secretion into the

internal ear, and also into the mastoid cells, while at the same time fistulous openings are perforated through the cells and the common integument external to and behind the auricle. As the caries is thus destroying the structures of the middle ear, the nerves of the chorda tympani passing across it become involved, and induce more or less paralysis of that side of the face, causing a degree of distortion and alteration of feature that, to the non-professional eye, is very alarming, as indicative of cerebral disease, while to the surgeon it demonstrates that important branches of the portio dura are suffering from extension of the disease. One of the most prominent parts thus affected is the mastoid process; this portion of bone may be thrown off entire, probably in consequence of the inflammatory action having disorganised the other parts of the temporal bone, and not unfrequently the petrous portion may also be completely separated, and, as has been already remarked, small fistulous openings may be found around the auricle, communicating with the tympanum. This portion of the organ should be examined from time to time during the progress of the disease in all its stages, and the more so in those cases where it has been brought into action by the exanthemata or by struma. By an early liberating of the integuments, even when the part has become carious, or as a preventive of further mischief, a free incision over the mastoid process will afford great relief, and possibly in some instances even save life.

PROGNOSIS.

The prognosis of deafness and of diseases of the ear, when subjected to judicious and persevering treatment in their earlier stages, is by no means discouraging. Of 2500 cases recently treated at the Royal Dispensary for Diseases of the Ear, about 1000, or two-fifths, proved to be curable: these included many cases apparently of the most hopeless character and of protracted duration. It must, however, be understood that the prospect of recovery will very much

depend upon the right moment of time being selected for the treatment; and it too often happens that, through the neglect of the patient and mistaken views, the disease is, in the first instance, either allowed to run its course unchecked or is rendered incurable by mismanagement. Patients are too often induced to expect that a disease unattended with pain will disappear without any assistance from art. Many imagine that an otorrhœa, instead of being—as it often proves—a symptom of a dangerous disease, is in fact salutary and ought not to be checked; others do not notice the gradual approach of imperfection in their hearing, until it has become very obvious to their friends; and, in both cases, the proper treatment is neglected, valuable time is lost, and at length organic changes are established which no surgical or medical art can reach or modify. It is much to be regretted that, in some instances, this neglect has been in some degree sanctioned by timid practitioners declining to interfere, and thus leaving the patient either to despair or to throw himself into the arms of the numerous advertising quacks, or else inducing him to hope for a spontaneous recovery from a disease which, in fact, requires for its successful treatment the resources of medicine and surgery in their more modern and advanced stage of cultivation.

GENERAL OBSERVATIONS ON TREATMENT.

In addressing ourselves to the task of treating Diseases of the Ear and its appendages, we must bear in mind that the structure of the parts does not differ essentially from that of other organs, and that therefore the prevailing diseases of these parts consist, like those of all other parts, of inflammation and its consequences, modified by the sex, temperament, constitution, and habits of the patient. From its contiguity to the brain, active inflammation of the ear is very liable to involve the cerebral mass or its membranes, and the extensive expansion of the filaments of the auditory nerve in the labyrinth may well render the organ sub-

ject to severe attacks of hyperæsthesia, neuralgia, or anæsthesia, misnamed paralysis. Moreover, it must be remembered, that an organ having such close nervous and vascular connections with the brain, the throat, and the facial nerve (through the medium of the chorda tympani), must be necessarily subject to sympathetic affections, which may be expected to take a wide range, and which must be well considered, if we would treat them with any degree of satisfaction or success.

There are three questions, therefore, which will naturally present themselves when we are consulted in a case of disease of the ear. 1. Is the disease *organic*, and if so, is it remediable? Does it consist of inflammation or its consequences? Is there any lesion of the nervous tissues? 2. Is the disease of constitutional origin? If so, what is the nature of the disorder of the health which has originated the local lesion? Is it gout, rheumatism, catarrh, dyspepsia, scrofula, or any other disease? In either case the treatment must be directed, of course, as far as possible, to the rectification of the error of constitution, conjointly with the removal of the local malady. 3. Is the disease sympathetic? If so, what remote organ is affected? Here, again, the organ originally affected must claim our attention.

In all these cases there are certain general rules in practice which are obviously indicated, but which are liable to be overlooked. For instance, the state of the secretions should never be neglected, particularly the cutaneous function; the general power or tone of the circulating system should be carefully maintained and regulated. The treatment will be pursued with great disadvantage, if the general power is on the one hand in excess, or above *par*, or, on the other hand, when it is materially deficient, or below *par*. The abstraction of blood in these cases may be brought within general rules. General bleeding is seldom required. Cupping and leeches are frequently necessary. Purgatives, as in all chronic diseases, especially in head affections, are of great utility. Mercury is equally important, and in

many cases absolutely essential ; it is, in fact, beyond doubt, one of the most efficient remedial agents in our hands. As a rule, alterative doses are all that will be required ; but there are certain exceptions to this. In acute otitis, as well as in affections clearly syphilitic, it should be given more energetically, even to the production of ptyalism. In addition to these remedies, iodine,* colchicum, and guaiacum are also important adjuncts, adapted to the treatment of special forms of ear-disease, and will receive due notice in the following pages. Many cases also require the sustained exhibition of quinine, iron, arsenic, and other tonics, in well-regulated doses.

LOCAL TREATMENT.

A few observations on the use of the syringe may not be out of place. It is not necessary that every deaf patient should be subject to a torrent of water forced against the delicate membrane of the tympanum, or the lining membrane of the meatus, with a powerful syringe. Much mischief has occasionally been done by this routine practice. The following rules, it is hoped, may not be considered too trifling or unimportant for insertion. 1. The syringe is only required when any foreign body or hardened wax is impacted in the canal ; or when lotions are necessary to wash out the discharges or to amend the morbid conditions of the parts. 2. The water used for injection should be pure and warm. The addition of soap is unnecessary, as water is the best solvent of the cerumen. 3. The syringe should not be so large as to contain more than two ounces, as, if it be large, the force exerted in using it may be too great, and may cause mischief.

Sounding the membrane with a probe is a barbarous and irrational, though common practice, directed to no useful or

* This remedy the author has found most useful in benefiting the general system when exhibited in the form of fumigation ; this will be dwelt upon more largely in the section on Diseases of the Throat, accompanied with enlarged tonsils and deafness.

intelligible end, and it cannot be too much condemned, as it is often mischievous, and cannot teach anything which is not discoverable by the speculum. Local applications, such as injections or lotions, used during the period of a discharge from the ear, should be applied warm, and the best syringe is a small elastic-gum bottle. It must be understood that this mode of proceeding is to be conducted with the greatest gentleness. If leeches be required during the progress of treatment, it is better to apply them over the mastoid process, or in the sulcus between that process and the lower jaw. Liniments and counter-irritants are useful during the progress of a chronic case, and none answer better than the tartar-emetic ointment applied behind the ear so as to cause pustulation. Blisters are efficacious in chronic diseases of the ear in children: but it is well to caution the nurse not to allow them to remain on any length of time; it were better that their application should be often repeated and for a short duration, one or two hours being sufficient. The use of the issue and seton will be discussed in a future section. They will be found of the greatest benefit where disease has advanced to disorganisation or caries of the bone, and likewise when any cerebral symptoms are present, which very frequently supervene in ear-disease, originating in neglected discharges, especially in children of a strumous habit. It must, moreover, be especially understood that position, quietude, and the other rules of hygiene should be as carefully carried out in the treatment of this class of diseases as in that of any other. On the same principle that we exclude light in inflammation of the eye, we seclude our patient from noises, likely to distress him, in inflammations of the ear.

In the preceding general observations on treatment, it will be seen that the author merely directs attention to the application of those well-established and familiar remedies which are based on general therapeutics, and that he has no confidence in any of the vaunted specifics which have been puffed into notice to deceive the ignorant and unwary.

It will be convenient to treat of diseases of the ear under four general heads :—1. Diseases of the auricle and meatus externus. 2. Diseases of the middle ear or tympanum and its appendages, including the gouty and rheumatic affections connected with deafness, and also the inflammatory affections of the throat and tonsil glands, involving the Eustachian tube and middle ear by extension or by sympathy. 3. Diseases of the internal ear, or labyrinth, including nervous deafness, and deaf dumbness, whether it be congenital, or the results of the ravages of disease, such as dentition, the exanthemata, typhus, phthisis, &c. 4. Obstruction of the Eustachian tube, and catheterism of that canal, the operation for perforating the membrana tympani, the artificial membrane, in cases of cophosis from perforation of the membrane by disease, &c.

CHAPTER I.

DISEASES OF THE AURICLE.

THE textures which enter into the composition of the auricle, besides the vessels and nerves common to all vital structures, are—common integument, cartilage, muscles and ligaments, and the mass of fat forming the lobe. All these are more or less subject to disease, particularly the skin or integument. In describing these diseases, we shall begin with those which are the most common, and then allude cursorily to the more rare.

CUTANEOUS AFFECTIONS OF THE AURICLE.

The skin and subcutaneous tissues of the auricle are very subject to eruptive diseases and other forms of inflammation. Of these perhaps erysipelas is the most important, and also one of the most common.

Erysipelas.—This disease affects the auricle in two very distinct forms. It often attacks the ear, in common with the face, head, and eyes, as a febrile disease; and then the internal structures, including the membranes of the brain, are not unfrequently at length implicated. The ear becomes hot, red, swollen, and sometimes blistered. The swelling commonly affects the whole auricle, together with a corresponding portion of the scalp, temple, and face, and the eyelids. It commonly traverses the whole of the scalp, and then the other ear becomes affected, together with the face, &c., on that side. The swelling is soft, diffuse, and irregularly circumscribed, and not accompanied by throbbing or acute pain; in that respect differing from *phlegmon*. It likewise differs from *erythema*, with which it is often

confounded, by the swelling which accompanies it, and by its tendency to vesication. It must be added, however, that erysipelas not unfrequently ends in abscesses, and matter is formed in the cellular membrane. The constitutional symptoms present in acute erysipelas will determine the *treatment*, which should generally be guarded. Depletion must be practised with caution, and with due regard to the constitution, age, and sex of the patient, &c. The author is desirous to urge however the great importance of administering emetics, followed by purgatives, in the very onset of the disease, as their use will often render other forms of depletion unnecessary.

Erysipelas also attacks the auricle very frequently in a *chronic* form; it presents externally the same characteristics of heat, redness, swelling, and vesication, without the general febrile condition attending the acute form. Nor is it disposed to extend beyond the auricle and the meatus externus, that canal being sometimes blocked up by the tumefaction it occasions. The disease is strictly chronic in its character, and often continues for months, or even years, constituting a common cause of deafness, chiefly in consequence of the serum secreted by the vesication going on in the auditory canal drying, and thus forming films and crusts which block up the passage. Some aggravated cases of otorrhœa are due to this cause, and are easily cured by constitutional measures. The cause of this condition of the auricle is generally constitutional, and often attributable to a torpid condition of the bowels, especially in elderly females, in whom the structures sometimes become exceedingly dense and hypertrophied.

Treatment.—Externally the common lead lotion applied or injected warm three or four times a day, will prove serviceable in the milder cases; but it is sometimes necessary to leech the parts, and apply calomel ointment made in the proportion of four scruples to an ounce of lard: this has great power in reducing the swelling. Extreme cleanliness must be observed, and it is often necessary, in elderly females, to insist upon the covering of the ear being light, the disease

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being aggravated by warmth. In those cases where the inflammation resists the ordinary mode of treatment, a solution of nitrate of silver, consisting of two scruples of the salt to the ounce of distilled water, may be advantageously painted over the parts, with the aid of a camel-hair brush: this causes a sensation of heat and smarting for a time, but that feeling soon subsides, and its beneficial influence is speedily evident. The action of this lotion may be regarded as of the nature called by our continental brethren 'abortive.' The cuticle becomes blackened very soon, and peels off, leaving a more healthy surface beneath: it rarely happens that a third application of the lotion is necessary. The constitutional treatment is that which applies to all chronic affections of this kind. The secretions must be attended to, especially the state of the bowels, and in some cases alteratives and tonics are necessary.

Such is the general character of erysipelas attacking the ear in this country; but Dr. Kramer, in his work on the diseases of the ear, makes allusion to a form of erysipelas attending the accumulation of wax, and diseased conditions of the ceruminous glands. The author has but rarely met with cases such as Dr. K. describes. One, however, is at present under his treatment; a lady, 40 years of age, in whom the erysipelas is of an erratic character, and accompanied with the symptoms described by Kramer. The patient complains of constant tinnitus, or singing in the ear, and of some hardness of hearing. These symptoms increase to a considerable degree after midnight, and are not mitigated until morning. On examination, the external ear presents an erysipelatous redness; it feels hot, and is extremely sensitive to the touch. The entire surface of the meatus auditorius externus is found to present a redness, rather pale than dark; it is entirely denuded of cerumen, or is covered here and there with a dark-brown thin and dried deposit thereof; the membrana tympani is of a dull appearance, and traversed by some large vessels.

In this form of erysipelas ordinary treatment fails, and a specific plan of treatment generally becomes necessary: the

general diathesis of the patient will be the guide. If the erysipelatous affection be founded on a rheumatic dyscrasia, then colchicum will be the chief remedy, and the skin should be stimulated generally by sulphur-fume baths. It is however a very intractable form of disease, and requires the utmost sagacity and vigilance on the part of the practitioner as regards diagnosis and treatment.

Herpetic and eczematous eruption on the auricle and in the angle behind the ear are exceedingly common, especially in children. They are often a source of great annoyance and irritation, and not unfrequently, by extending to the meatus externus, produce deafness, in consequence chiefly of the infiltration and thickening of the lining membrane and the secretions which dry upon its surface. It likewise may happen that a chronic deposition may take place between the layers of the membrane of the tympanum, and thus opacity, thickening, and consequent deafness may be caused. The disease consists of inflammation of the dermis, which rapidly induces an eruption of fine pellucid vesicles, containing clear serum : this either dries up and degenerates into dark mahogany-coloured crusts, or becomes purulent, and is deposited in crusts of a dirty yellow appearance. The colour and appearance of these crusts, which may extend, and often do, over the head and face, present an important indication in their treatment. The yellow crusts reveal a disposition to purulent secretion, which commonly accompanies a state of latent debility, requiring tonic medicines in combination with aperients ; whereas when the crusts have a mahogany hue, a condition of sthenic inflammation generally exists, and it will yield to depletion alone.

It cannot be too carefully borne in mind that all these eruptive diseases, whether affecting the auricle or the neighbouring parts, are occasionally symptomatic of irritation arising from dentition or from the gastric disorders of children ; and if the affected surface be very extensive, and the discharge free and copious, its sudden suppression may be followed by torpor, giddiness, and even by more serious

affections of the brain. For these reasons considerable judgment and experience are requisite in the management of an apparently trifling disease, and no general rule can be laid down, except that purgatives are commonly useful, and external applications as generally worse than useless. Occasionally the application of leeches may be necessary, particularly in those cases where the auricle is in a state of tumid and active inflammation and the crusts dark-coloured. In the milder cases occurring in children, the hydrargyrum cum cretâ or calomel in small doses will be found useful; the utmost cleanliness should be observed. Frequent ablutions with tepid water are essential. Sometimes in the adult, but more frequently in children, the inflammatory tendency is violent and persistent, and will only yield to many weeks' persevering depletion; and even after the active form of the disease has been subdued, it often continues in a chronic or sub-acute form, harassing the patient for months, or even for years; it then presents one of the most intractable forms of chronic deafness, produced by the infiltration of the tegumentary lining of the meatus and the ceruminous portion of the canal, which almost or quite obliterates the passage.

The treatment of this very common and very annoying disease must be attempted, not by any fixed or invariable rule, but by taking into account the circumstances of each individual case. The state of the constitution of the patient, the peculiar morbid diathesis under which the disease is manifested, and the condition of the general health,—all these are circumstances which must be well considered before prescribing for the patient. It has occurred to the author to see cases of this distressing affection of the ear in elderly females, commencing at the change of life, annoying them for many years, and resisting every mode of treatment until change of air has been resorted to, when the disease has disappeared, by an effort of nature, under circumstances favourable to health and vigour. Other cases have been presented for treatment, in which a well-marked syphilitic taint has been present, characterised by a

copper-coloured eruption, ulceration of the throat, &c., which yielded to a mercurial course carefully conducted. In some instances the disease has partaken of a gouty diathesis, which the following case illustrates.

Case.—An elderly lady had been the subject of an eczematous eruption, affecting the auricle and meatus on both sides, which considerably impaired the hearing for many years. The disease appeared periodically, being generally worse during the autumn months. It had resisted various modes of treatment, until at length the patient was attacked by a severe fit of the gout in the foot. Upon this outbreak of the gout the eruption became less troublesome, than it had been previously for many years. She now consulted the author, who advised a reduced diet and a course of colchicum and soda, which completely cured the eruption and the attack of gout. She has since been more than once threatened with a relapse; but as soon as the skin becomes in the least degree irritable, or the meatus begins to itch or tingle, she has recourse to the same medicines, and always with a beneficial effect. She has also suffered occasionally from gout in the smaller joints.

With regard to external applications in this disease, it is a safe practice, for the reasons already stated, to avoid their use until some constitutional treatment has brought the disease under control. But at this period, especially if the patient suffer severely, as is often the case, from the itching and tingling of the parts, much relief has been experienced from the use of a lotion, consisting of one drachm of the tincture of iodine and the same quantity of the diluted acetic acid (*Ph. Lond.*), with ten or twelve ounces of distilled water. In other cases the black or the yellow wash has been found useful. If the parts be excoriated, an ointment, composed of the chloride of mercury (calomel), in the proportion of one drachm to an ounce, forms one of the best applications. Sulphur-baths may also be used with advantage.

Phlegmonous inflammation not unfrequently attacks the auricle, and terminates in abscess; or, again, that part

may be the seat of a furuncle. Collections of matter must be treated according to the common principles of surgery. The author has never seen the auricle attacked by carbuncle. Probably the structure of the part protects it from the ravages of this now very common disease, to which, however, the congener disease, *furuncle*, is somewhat allied.

A variety of inflammation affecting the auricle among the insane has been described by some German writers, but no instance thereof has fallen under the author's notice, nor does it appear that Mr. Wilde has met with it; his inquiries among the medical superintendents of lunatic asylums, however, lead to the belief that it occasionally occurs in this country, and is more or less the result of violence, and was in consequence more common in the days of restraint than now. The auricle, it is said, swells enormously, until, in some cases, it bursts, when thick dark-coloured blood and serum are discharged. The ear subsequently remains thickened and indurated, or, it may be, disfigured and shrunk.

Excoriations behind the auricle are frequently seen in healthy infants, and appear to result generally from want of cleanliness on the part of the mother or nurse.

Ulceration may occur on any part of the auricle, either in a simple or a specific form, but the former is very rare. Secondary syphilis frequently attacks the auricle, and rarely quits it without assuming a phagedenic form, and destroying some portion of its textures. Of the treatment but little need be said here, except that the cautious and judicious use of mercury can seldom be dispensed with.

Cancerous and Lupoid Affections of the auricle are occasionally met with, generally in the form of ulceration. The former goes on to the destruction of the entire organ, and ultimately of life: of the latter the author has not met with any instance, but his friend Mr. Hunt has found the different forms of Lupus generally controllable by the internal use of arsenic.*

* See Hunt "On the Skin," and Dr. Druitt's "Surgeon's Vade-Mecum," Sixth Edition.

Pemphigus is seen, though rarely, attacking the auricle in a chronic form. It requires constitutional, and generally tonic, treatment. Mr. Wilde describes an acute form of this disease as frequent in Ireland, under the name of *Pemphigus gangrenosus*.

Tumours.—The auricle is sometimes the seat of tumours of various kinds; they may contain hydatids, or a mass of fatty matter, or they may be steatomatous, sebaceous, encysted, or fibrous. The lobe of the ear may be largely hypertrophied. They are best treated by early excision. The auricles are also the seat of tumours in cases of that horrible disease known as elephantiasis. When the lobe is attacked, it sometimes swells enormously. In gouty constitutions (says Dr. Graves) the lobe is subject to hypertrophy. Instances of nævus seated in the auricle are sometimes met with: indeed almost the entire appendage has been thus affected. Colles, in 1810, tied the posterior auris in the treatment of a nævus of the ear.

ACCIDENTS AND MALFORMATIONS OF THE AURICLE.

Wounds of the auricle will commonly heal by the first intention: it sometimes happens that by a stroke of the sabre, or of some other sharp instrument, the whole auricle has been accidentally amputated: by prompt surgical management its reunion may be accomplished. This used to be a common mode of punishment in the East, especially inflicted on prisoners of war: Hyder Ali's custom was to cut off his prisoners' noses. This proceeding on his part led to the Indian revival and modification of the Taliacotian operation. The author was once called hastily to a girl, who in a fit of epilepsy, had fallen with her head on the edge of a scraper, by which the left auricle was nearly severed from the head, it hanging only by a small piece of undivided integument. It had been in this state for some hours. It was replaced by means of the interrupted suture, and secured by adhesive plasters; and ultimately united without the slightest consequent deformity other

than a temporary narrowing of the meatus, which required the use of tents for some time. Lacerated wounds of the auricle should be treated according to the ordinary principles of surgery.

Flattened Auricle.—The auricle is liable to be perfectly flattened, by being bound to the head by the head-dresses of women, and sometimes by those of children. This deformity is certainly an occasional cause of deafness.

False positions of the Auricle.—This is a congenital deformity, which admits of no remedy.

Cleft, or partial Auricle is sometimes seen as a congenital defect.

A total absence of the Auricle is rarely met with. It is sometimes replaced by a mere fold of skin. It cannot be doubted that the power of hearing must be more or less impaired. However lightly some writers may affect to esteem the utility of the beautiful and elegant structure which forms the external ear, the author cannot be brought to believe that it is *merely* ornamental. Nor can the naturalist fail to observe, in taking a review of the varied forms of the auricle in the different *genera* of animals, how beautifully it is adapted so to collect and reflect the rays of sound, as to conduce to the well-being of the race in various ways.

The helix and lobe are often wanting: the concha has been found convex, instead of being concave, and Schmalz mentions a case where there was not any external meatus. Cassebohm, however, describes a case still more extraordinary: there were four auricles, two on each side, one on each in its natural situation, and the other lower down the neck. In this case there were also two petrous portions to each temporal bone. In some cases where the auricle is entirely wanting, it is said that the hearing has still been perfect, but it cannot be doubted that the auricle performs most important functions as an auxiliary to hearing.

CHAPTER II.

DISEASES OF THE MEATUS EXTERNUS.

Mode of Examination.—In order to understand the morbid conditions of the meatus externus, it is necessary that a practitioner should first familiarise himself with its appearance in a state of health. It will have been seen in the descriptive part of the anatomy of the ear, that this canal is by no means straight, and therefore, in order to its actual examination, a speculum is obviously necessary; and the knowledge which the practitioner will acquire of the morbid appearances of the auditory canal will much depend upon the kind of speculum which he employs.

The instrument in common use for this purpose is funnel-shaped, and very small in the disc, so that it answers the purpose of a speculum very imperfectly. As an improvement upon this instrument, the author has long been accustomed to use a bivalved speculum, figured page 19, with a disc of at least an inch and a half in diameter, and the other extremity small enough when closed to enter a meatus very much contracted from disease or any other cause. One great advantage in using the large disc consists in the canal being illuminated by indirect rays, which are thus collected in sufficient quantity to render the canal or membrane visible, when it is not convenient to have a lamp immediately opposite the orifice; and a further convenience of the bivalved form will be found in the case of a foreign body in the meatus, which (an assistant holding the light a little on one side) the operator can hook with a probe into the blades of the speculum, which has sufficient spring to close upon the foreign body, so that it may thus readily withdrawn.

In using this instrument, it must be recollected that the canal is divided into two distinct portions, the external being cartilaginous and therefore elastic, the internal osseous and therefore undilatable. It follows of course that all dilating force used in the examination must be expended upon the cartilaginous portion, as any pressure made upon the osseous portion of the canal can only give pain or excite inflammation, without effecting the slightest degree of dilatation.

The first object to be examined, after ascertaining that the canal is duly pervious, is the condition of the ceruminous circle, already described, consisting of a circle of fine hairs covered in health by a sort of glutinous dew. This is the cerumen, which in health is of a yellowish-brown colour, and of the consistence and appearance of honey; of great tenacity, but varying in this respect according to the healthy or diseased condition of the organ, exposure to the atmosphere, and the age of the individual.

The presence of this ceruminous circle is diagnostic of a healthy condition of the meatus externus; if deafness co-exist with a normal condition of this circle, the probability is, that the cause will be found elsewhere, and probably in the middle ear, from some disordered condition of the parts about the fauces. On the other hand, if the cerumen, instead of being arranged in a circle, be distributed in patches, or instead of being of the consistence and appearance of honey, be dried and scaly, then, in either case, it is to be presumed that the membrane lining the meatus is in an unhealthy condition, and requires local as well as general treatment. This yellow circular fringe is in high perfection in those persons whose hearing is very acute. The author has examined it in many blind musicians, and is able to confirm the observation of Buchanan, who further compares this secretion with the lachrymal fluid that moistens the eye; the one being subservient to perfect audition, as the other is to perfect vision.

Disease of the Ceruminous Glands.—These glands, from constitutional disturbance or other causes, are subject to

inflammation, which speedily runs into suppuration, and the formation of small abscesses. In that case the canal is nearly obliterated by the swelling which ensues; great pain, heat, and throbbing are complained of, and often temporary deafness. It is needless to say that if the inflammation be not subdued ere suppuration ensue, which should be attempted according to the ordinary principles of surgery, the earlier these little abscesses are evacuated the better; but it is necessary to divide the parts freely. Some individuals are very prone to this diseased condition of the meatus, and unless a proper preventive plan be adopted, it is apt to cause a thickening of the lining membrane, and consequently a narrowing of the calibre of the canal. The constitutional cause should therefore be inquired into, and removed by appropriate treatment. In very many cases which have come under the author's observation, alterative doses of the bichloride of mercury have been found very efficacious. The local treatment may consist in the use of warm astringent injections of acetate of lead thrown in two or three times daily. The meatus should be moistened after each injection by the citron ointment.

Supposing the ceruminous circle to present a normal appearance, the next thing to be examined is the membrane of the tympanum, which examination constitutes one of the most important objects connected with the subject. This membrane presents itself, as has already been described, at the extremity of the meatus, lying somewhat obliquely, so that the lower edge of the membrane in each ear approaches its fellow, while the upper edge slightly diverges, the plane of the membrane being directed somewhat posteriorly and downwards. If the membrane be healthy, it will be free from any coating of wax, and of a greyish hue. Through its semi-transparent structure may be plainly seen the manubrium of the malleus in its position approaching the membrane from above downwards, and slightly attached to it in the lower third of its disc; at this point the membrane shows a slight convexity outwards, which is not perceptible in young subjects. It

should likewise be observed, that in some cases we meet with considerable opacity in the membrane when the hearing is nevertheless very perfect.

Accumulation of Wax.—The meatus is frequently found more or less blocked up with wax. This generally arises from previous inflammation of the ceruminous glands and of the membrane of the meatus, from exposure to cold air, cold-bathing, &c. Persons who perspire much about the head seem to be more liable than others to collections of cerumen. In such a case—and this is one of common occurrence—the hearing is generally dull; sometimes the patient is deaf, and complains of various noises in the affected ear, particularly when masticating his food. Sometimes after yawning, or some other sudden expansion of the jaws, he hears a noise in the ear which he describes as “a crack,” immediately after which the hearing is restored, but the noises still continue. The explanation of this fact is, that the motion thus suddenly communicated to the impacted wax has partly dislodged it, and thus allowed space for the access of the sonorous rays to the tympanum. The recurrence of deafness is owing to the return of the impaction to its former place, or to the filling up of the space by additional diseased wax.

On inspecting the ear, the interior parts of the meatus will be found occupied by a large mass of wax, which blocks up the tube and obscures the membrana tympani, except at the upper part, where the wax is detached from the tube, leaving in general a horizontal gap. It is through this aperture that sounds reach the membrana tympani, and thence the vibrations are communicated to the nervous fasciculi. Great diminution of hearing, and shortly afterwards deafness itself, are the never-failing consequences of inattention to these symptoms; relief is readily afforded by the removal of the collection.

The author has frequently found that patients affected with this complaint were in the habit of stopping up the mouth of the tube with cotton or wool, which by some means or other had been forced inwards, and thus formed a

nucleus for the indurated cerumen. Surgeons are sometimes in the habit of extracting wax from the meatus by means of the end of a silver needle or probe ; a practice which is certainly reprehensible, because of the danger which may be incurred by the membrana tympani on any sudden motion of the patient's head, or by the coughing or sneezing so frequently produced in operations about this canal, by the reflex nervous action caused by any irritating instrument passed into the tube. The extremely sensitive condition of this tube in some persons will account for the irritation produced on introducing a speculum or any other foreign body into this canal. When we bear in mind that the nervous supply of this part is from the fifth, the portio dura, the second and the first vertebral nerves, it will account for the pain as well as the coughing, and even fainting, which sometimes occur when these parts are examined surgically.

The wax thus accumulated will generally be found of a dark colour ; it is a good general rule not to syringe the ear or attempt the removal of the wax, until, by inspection, its presence has been ascertained. This having been done, the best mode of removing it is certainly by the syringe, the liquid being thrown in, not directly upon the wax but on one side thereof, so as to detach it laterally. If much difficulty be experienced in its separation from the cuticle and in its ejection, it may be loosened and even extracted by means of the fine long-bladed forceps, or with the aid of the small silver spatula, acting as a lever, or by a blunt curette. Some care is needed in using these instruments for this purpose, as the lining membrane of the canal is very delicate and irritable.

The removal of the indurated accumulation of cerumen leaves the membrane of the tympanum and the lining membrane of the meatus in a reddened or injected and tender condition, especially in those instances where the collection has been of long standing. This may partly be the result of the efforts made for its extraction, or, again, of the irritation caused by the pressure the hardened mass exerted on the neighbouring parts. It has even been said that inflamma-

tion, suppuration, and even exfoliation have been induced by the compression it exerts; but this opinion is not universally subscribed to, for Kramer says, respecting hardened wax producing ulceration of the membrana tympani, "that it is not only unfounded in experience, but is opposed to all experience. Nevertheless it will easily be understood that, according to the usual principles of surgery, pressure exerted by a foreign body—and a collection of indurated and diseased wax in the ear operates as a foreign body in the meatus—may and will exert an injurious influence on the surrounding delicate membrane, and may lead to inflammation, and even to suppuration and ulceration, and may thus give rise to a form of otorrhœa, all which maladies must be treated according to first principles, the foreign or irritating body being first removed."

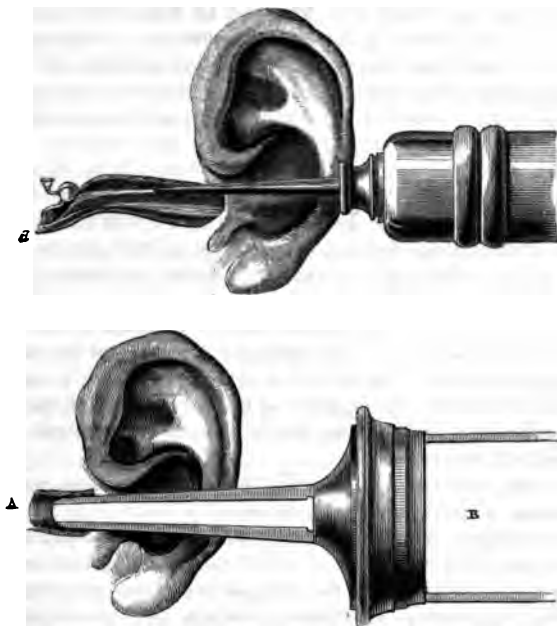
Syringing the Meatus.—This is an operation very frequently performed, and, though simple, yet the principle on which it ought to be conducted is often less attended to than in operations of a more complex nature.

An auricular syringe for this purpose ought to be made of silver, ivory, or brass; the barrel or body should be about four inches in length, and three-quarters of an inch in thickness, with a nozzle of about two inches in length, and seven-eighths of a line in diameter at the extremity; it should contain about two ounces of water, which should always be used warm.

When the meatus is to be syringed, an assistant ought to secure the head of the patient with one hand, supporting the chin, and keeping the head nearly upright, and with the other should elongate the cartilaginous part of the tube, by drawing the auricle upwards, outwards, and a little backwards; then the operator taking the syringe, previously filled, in his right hand, and resting the back of his left hand on the angle of the lower jaw, by these means keeping the instrument steady, should introduce the nozzle of the syringe into the meatus nearly half an inch, and press it rather against the superior edge of the canal, so that it may close up as little as possible of the diameter of the meatus. This is necessary in order to give the fluid exit,

and prevent its injuring the canal and the membrane of the tympanum by the pressure which it would otherwise exert against them, if there were not any means for its exit from the passage.* This operation, which it may be neces-

Figs. 10 and 11.



* The engravings on this page represent—one, the wholesome and proper application of the syringe, and its adaptation to the passage, so that with care no danger can accrue; while the other shows the passage completely blocked^d up by the nozzle of the instrument, the result being that the injected liquid cannot escape while the nozzle remains in the meatus, and the membrane of the tympanum may be ruptured by the pressure exerted by the fluid continuously thrown in, it not having any means of escape, so as gradually to diminish the pressure. At the same time, under these circumstances, the patient must inevitably suffer great pain from the presence of both the instrument and the injected fluid in the canal.

sary to have recourse to in patients of all ages, from early childhood to advanced old age, requires extreme caution and gentleness in the operator. This caution indeed is by no means unnecessary, as the author has met with many lamentable instances in which mischief has been done by the careless use of the syringe. Very recently he was consulted by an elderly lady, who had an impaction of hardened rocky cerumen adhering tenaciously to the surface of the membrana tympani. The violent attempts which had been made to remove this by the syringe had produced a discharge of blood in the first instance, and subsequently a severe attack of otitis. This having been subdued by leeches, &c., a desquamation of the mucous lining of the canal ensued, and the impaction was then easily removed by gentle syringing. In the cases where a very moderate use of the syringe does not succeed, especially if the operation give much pain, it is better to desist, and to apply a little almond oil, in which a small portion of the ointment of nitrate of mercury has been dissolved, and then, after the lapse of a few days, the syringing may be resumed with every prospect of success. The tenacity with which impacted wax sometimes adheres to the parietes of the canal is surprising, and a great deal of patience is required in effecting its removal.

It has been already observed, that the wax in these cases assumes a dark appearance, indeed it sometimes becomes almost black; but care should be taken not to mistake for wax the black appearance of a dried sanguinolent discharge from the membrane of the tympanum, which sometimes looks very much like hardened cerumen. The practitioner is the more liable to fall into this error where one ear of a patient is blocked up with hardened wax, and there is in the other a fungoid growth on the membrana tympani, on which a dark hardened mass of coagulated blood has dried up, as occurred in the following

Case.—A musician of middle age applied to the author in the year 1851, complaining of a difficulty of hearing, and noises in both ears. On examining the left ear it was

clear that the meatus was blocked up with wax, which with some difficulty was removed by syringing, upon which the hearing was restored on that side. Upon examining the right ear, a similar appearance presented itself, there being a very dark-coloured dry mass, concealing from view the membrane of the tympanum. In the belief that this, as well as the collection in the left ear, was hardened cerumen, the syringe was used in the usual way; the mass having been thus removed, was found to consist of a dried coagulum of blood; consequently, a considerable oozing of blood followed, which continued for three days, despite all the remedies used for its suppression. There was, it appeared, an aperture in the membrane of the tympanum, and likewise some chronic enlargement of the tonsils, and a thickened condition of the mucous membrane of the throat, together with deranged health. It is not therefore surprising, that after the hemorrhage had ceased, a severe attack of local inflammation ensued, which extended to the Eustachian tube, and terminated in an abscess at the back of the pharynx. The abscess was opened, and the patient ultimately recovered, with only a slight diminution of hearing on the right side, the aperture of the tympanum closing up after having been open for many years; for it appeared, on inquiring further into the history of the case, that when he was a child, the patient had had an abscess in the tympanum following an attack of scarlatina, which, bursting through the membrane, caused a foul discharge from the meatus for years, with other evidences of an open tympanum. The discharge had ceased for three or four years before the author saw him, the perforation being filled up by the dried coagulum which was removed by the syringe. Under these circumstances, the discharge must have taken a different course, and had probably drained through the Eustachian passage.

The removal of indurated wax, even by the most gentle use of the syringe, is sometimes attended with considerable pain at the time, and irritation afterwards.

Case.—A young *prima donna* came to the author some

years ago, to request him to remove an accumulation of wax in both ears. On the right side she had been deaf for many years ; on the left, the deafness was recent, and the hearing was restored upon the removal of the obstruction. But on the right side, after the meatus had been cleansed by the syringe, the use of which caused severe pain, a discharge was established, which continued for a considerable time, but ultimately yielded to tonics and aperients, with astringent injections. The hearing was perfectly restored.

In some instances the wax acquires a hardness and tenacity which would surprise those who are unacquainted with the diseases of the ear, and which render a certain degree of dexterity necessary for its removal. Sometimes the pressure of this hardened mass disarranges the form of the membrana tympani, causing it to bulge inwards, so that, on the removal of the wax, instead of the hearing being immediately restored, as is usually the case, it is at first rather blunted than otherwise ; but if the patient can inflate the tympanum, the membrane is soon restored to its normal figure, and the hearing is recovered. If the inflation cannot be effected, the cautious introduction of the Eustachian catheter may possibly be called for.

The accumulated wax, when it becomes dry, sometimes excites so much irritation in the mucous lining of the canal as to cause chronic inflammation, which results not unfrequently in a desquamation of the membrane ; this latter is then thrown off entire with the wax, which it covers as an envelope. Sometimes ulceration is produced from this cause ; it must be treated by emollient applications, and the discharge cleansed away with a weak astringent injection.

A barrister of eminence applied for the author's advice in the year 1851, for deafness, with disagreeable noises and singing in the ears ; it had annoyed him for more than a year. For many months he had been under the care of a physician, who had treated him for some supposed affection of the brain, for which the patient had gone through a long

course of medical treatment without any relief to the symptoms he complained of. Upon inspecting the meatus, a small mass of hardened wax was seen firmly adhering to the external face of the membrane of the tympanum; it was removed with very considerable difficulty by cautious syringing. The mass was observed to be surrounded by a cast of the mucous membrane. On its removal the tympanic membrane was seen to be much injected and extremely tender. After a few applications of almond oil, mixed with a little of the ointment of the nitrate of mercury, the inflammation subsided, the patient completely recovered his hearing, and the noises were no longer heard. This case shows the importance of investigating the local causes of symptoms, which so often simulate disorder of the brain or of its membranes.

Foreign Bodies in the Meatus.—Children are apt to introduce into their ear-passages peas, cherry-stones, beads, pieces of slate-pencil, and sometimes pellets of blotting-paper, &c. In such a case, if the foreign body be likely to swell under the effects of heat and moisture, it is imperative that it should be immediately removed; but if it be a hard body, such as a bead, piece of slate-pencil, a pebble, &c., it may remain for years without causing inflammation or irritation, and its presence there may even be altogether forgotten; the chief indication of its presence being a greater or less degree of diminution of hearing, to which the person may become so accustomed, as long as the auditive powers of the other ear are perfect, as scarcely to notice it. In some rare cases the most injurious consequences have followed the presence of a foreign body in the ear, especially among children. It has caused extreme pain, a high degree of inflammation, followed by otorrhœa, and extending to the brain, leading to convulsions and death; or, again, the nervous irritation thus set up has induced epilepsy (Itard). The inflammation and suppuration may induce ulceration of the membrana tympani, the drum itself may next become the seat of the inflammation, matter may form in it, caries may ensue, and the entire of the

middle and internal ears may become thoroughly disorganised. If the cause of all this mischief be not removed, and means be not employed to check the disease thus set up, the temporal bone, in addition to the osseous part of the organ of hearing, may next be involved in the caries, the membranes of the brain may become inflamed, and suppuration take place between them, or the brain itself may be affected, and abscesses form in it, attended by all, or nearly all, the symptoms indicative of phrenitis in the acute or subacute form.

A short time since the author was consulted by a young man who was suffering from a troublesome and offensive otorrhœa, which had been preceded by an inflammatory attack in the meatus, supervening on influenza. Upon examination of the meatus, a piece of slate-pencil, about a quarter of an inch in length, was found imbedded in pus; it was removed with a pair of forceps, and the discharge ceased on the use of astringent injections for a few days. It appears that, when a boy at school, some five years previously, he had slipped the slate-pencil into the ear-passage; but, as it did not produce any irritation, he had totally forgotten the circumstance until its discovery consequent on the examination of the ear made to ascertain the cause of the otorrhœa.

Great care and gentleness are required in effecting the removal of foreign bodies from the meatus. It should be borne in mind that we are very frequently called upon to operate in these cases on the mere suspicion that something has been pushed into the ear-passage by the child; and it frequently happens that, notwithstanding the most accurate examination, nothing can be discovered in the meatus.* The author had lately to examine a child, three years of

* An interesting case was published in "The Lancet" some years since, and since reprinted in almost every work on Aural Surgery, in which fatal injury was inflicted on the middle and internal ears, the inflammation and suppuration extending to the membranes of the brain, the result of long-protracted futile attempts at extracting a nail supposed to be in the meatus of a child. The autopsy showed that there was not any portion of nail there or in the tympanum, and that the parts had been subjected to the most unjustifiable and unnecessary violence.

age, the mother fancying that it had inserted a pin into the ear, and that the head could be seen shining in the meatus; this, however, on examination, turned out to be a fine epithelial scale, lying at the bottom of the canal, which at first sight certainly much resembled the appearance of a pin's head. The further history of the case showed that the pain complained of by the child was a symptom of chronic inflammation attacking the auditory canal from cold, which was relieved by warm injections for a few days, with aperients.

Substances which are smooth and globular, as beads and the like, may remain in the meatus for years without causing much disturbance, but if they have a rough surface they may cause considerable irritation, and sometimes inflammation and obstinate otorrhœa.

Having satisfied ourselves of the fact that a foreign body is in the meatus, we must proceed cautiously to its removal. Various instruments have been recommended for that purpose, but the author has found no difficulty in effecting the extraction with the forceps figured in plate 12, page 74. If any difficulty occur, it is better to desist for a few days, than to run the risk of doing mischief by vain and reckless attempts, the result of which may be very serious, even to the destruction of the organ of hearing, and in some very sad cases to the loss of life itself.

The irritation produced will probably end in an increased secretion of wax, and after a few days of quiet, a few injections of warm water thrown into the meatus will in general easily remove the foreign body. If, as often happens, mischief has already been done by clumsy attempts at extraction on the part of the patient or of his friends, the inflammation so set up must of course be treated by emollient measures, and allowed to subside before any further attempts be made.

Pins are liable to be dropped into the meatus, of which the author has known three instances, in one of which the accident proved fatal by the otic inflammation extending to the brain. In a second case, the pin was readily re-

moved. In the third, so much inflammation and swelling of the meatus had been produced by fruitless endeavours at extraction, that, upon the patient applying to the author, neither the pin nor the membrana tympani could be seen. The patient was treated antiphlogistically, and kept quiet; but alarming symptoms supervened, the chief of which were violent pain in the head and delirium. At the end of a month, an abscess formed between the auricle and the mastoid process, upon opening which the pin presented itself, and was removed; all the active symptoms immediately subsided, and ultimately she recovered with but little damage to the organ of hearing.

Insects or Worms in the Meatus.—Despite the popular error respecting the nauseous quality of the wax in the meatus, insects will occasionally find their way into that canal. The dropping or injecting sweet oil into the meatus is said to be immediately destructive to such insects as are liable to infest that passage. Their removal may generally be effected by syringing the passage with warm water only. A clergyman applied to the writer, complaining of great itching and irritation in the ear, with noises and singing, he believing that a bug had crawled into his ear during sleep. The examination of the meatus did not reveal anything of importance. He complained of head-ache and giddiness, for which he was treated medically. The noises did not cease, nor was the irritation relieved. After a few days, a small abscess formed on the side of the meatus, and on its being opened, a large dead bug was removed, which had evidently insinuated and buried itself in the mucous membrane, ere the meatus was examined in the first instance. It is perhaps needless to add, that with the discharge of the abscess all the unpleasant symptoms ceased.

In a case of long standing and neglected otorrhœa, the author had recently an opportunity of examining some parasites which had been taken from the ear of the patient, a boy of 16; they had all the appearance of the entozoa, which are not unfrequently seen in the aqueous humour of the eye.

On Diminution of Hearing arising from Imperfect Secretion of Wax.—Patients who are affected with a diminution of hearing, arising from an imperfect or diminished secretion of wax, complain of noises, of dry rustling sounds in the ear, particularly during mastication, and sometimes of ringing noises in the head ; there is no acute pain in the organ, but often a dull sensation ; and at times, when the atmosphere is clear, there is a total remission of all the above symptoms. Patients in this state are usually of a bilious habit, with deranged health, and constipated bowels ; and their glandular system is apt to become diseased on being exposed to the least change of temperature in the atmosphere.

As this disordered or diseased condition of the ceruminous glands is often symptomatic of constitutional affections, so it is therefore requisite not only to inspect the parts engaged in the local malady, but also to ascertain, if possible, the primary cause of the complaint, whether it be local or general ; and to inquire into the diseases to which the patient may be subject ; in fact, to ascertain thoroughly the history of the case before the practitioner proceeds to prescribe, or subject his patient to syringing, which should not be practised in any case as a matter of course, but only after ascertaining that the meatus contains extraneous matters which cannot be removed by any other means. It often happens that the symptoms of deafness, noises in the ears, &c., are present in the two opposite cases, namely, when there is a redundancy of wax and a consequent impaction, and when there is a deficiency, with or without a pathological change in the characters of the cerumen. In this latter case syringing will cause mischief ; indeed, many instances have come under the author's notice in which injury has been done by the indiscriminate and prolonged use of the syringe.

Upon examining the meatus when the deafness arises from a deficiency of wax, this passage will be found to be red and granular, with patches of dried wax adhering here and there to its surface, and the membrane of the tym-

panum generally opaque ; with this condition of the meatus is often associated a diseased condition of the throat. The treatment in this case must depend upon the state of the constitution and of the general health of the patient. Where the secretions are deficient or unhealthy, which is often the case, they must be restored by appropriate medication ; the torpid condition of the alimentary canal, which is usually a prominent feature in the malady, requires particular attention. It is frequently necessary to unite tonics with aperients. When the disease occurs in chlorotic females, or in persons debilitated from any exhausting cause, such as excessive discharges or long-continued draining of blood, the preparations of iron will be preferable to any vegetable tonic. The author has also found great advantage from sponging the skin daily with warm salt water, and afterwards applying friction. The salt water shower-bath may also be found very useful when the patient is strong enough to bear the shock. The diet should be nutritious, and exercise in the open air is highly desirable. The local treatment consists of dropping into the ear, night and morning, a weak solution of acetate of lead, or of nitrate of silver, two grains to the ounce. The throat must be examined, and if there be any relaxation of its lining membrane or enlargement of the tonsils, warm, stimulant gargles, composed of rose infusion and myrrh, or, what is better, of port wine, will be found efficacious. The Eustachian tube will seldom, if ever, require any manual interference in these cases. The circumstances which may render it desirable to explore this canal surgically, will be alluded to in the chapter on diseases of the throat in connection with the enlarged tonsil.

In no case of this kind ought we to be satisfied that the patient is cured so long as the ceruminous circle is not complete. It forms a very important diagnostic sign of the state of the meatus.

Deficiency of wax will frequently occur in persons predisposed to rheumatic inflammation of a chronic character, and is not uncommonly the result of cold bathing ; it is

then attended with partial deafness and distressing noises in both ears, which will continue to harass the patient for some time after the disease has been removed. Much benefit will be derived from warmth and the employment of sudorifics, particularly of the vapour-bath; the state of the throat must, however, form the principal object of attention to the practitioner, as the diseased condition of the glands is essentially constitutional.

The Catarrhal Inflammation of the Meatus, which so frequently attacks children during dentition, and adults at all ages, generally commences in the ceruminous glands, and that portion of the canal in which they are situated, where it continues in a mild form for some months, or even years, until, through the negligence of the patient or from some exciting cause, such as atmospheric changes, irritation from applying improper remedies, or picking the ear, &c., it becomes diffused over the whole lining membrane of the meatus in the form of acute inflammation, and ultimately results in one of the most troublesome forms of otorrhoea. The symptoms which usher in this disease are marked by considerable itching and irritation in the canal, the entrance to which at length becomes swollen and narrowed, and pain is then generally felt, sometimes amounting to a severe ear-ache, with fever, and even delirium. A vesicular discharge next appears, which, upon any exciting cause, becomes purulent and offensive. This inflammation may attack one ear only, or both simultaneously, or consecutively. It is generally associated with noises in the ear, and dulness of hearing. Upon inspecting the meatus when the disease is in its early stages, there is seen an inflammatory redness, and the mucous membrane is raised in patches, thickened, and pulpy. When this form of inflammation is complicated by the rheumatic diathesis, the patient complains of a sensation of soreness, often amounting to pain, especially on pressure, all over the affected side of the head, and the scalp is sometimes even a little swollen, the disease in fact having lighted up a more or less severe rheumatic attack of the integuments

of the head. When the disease has been neglected, granulations, fungoid growths, and in some cases polypi sprouting from the ceruminous glands, are met with in the advanced stages. In fact this inflammation presents itself to the surgeon in various phases, and he seldom sees it at its commencement.

This malady may be produced not only by constitutional causes, but by local irritation set up by the extension of eruptive diseases into the meatus, by foreign bodies, &c. The prognosis is generally favourable if proper treatment be had recourse to at the commencement, otherwise it may become a very intractable disease, terminating either in the production of polypi, or in the filling up of the meatus with morbid granulations, or even in the total destruction of the organ, by caries and exfoliation of bone.

Case.—A painter, thirty-six years of age, came under the author's care at the Dispensary; he had been subject to a chronic discharge from both ears from childhood, and never remembered to have been otherwise than partially deaf. He attributed the disease to cold bathing. He had latterly suffered from a severe attack of influenza, and the right ear became exceedingly troublesome, with itching, tingling, and humming. He incautiously used a piece of pointed stick to allay the itching, the point of which broke off, and became entangled in the mucous lining of the meatus, from which it was with some difficulty removed. The author saw the case shortly afterwards, when the patient complained of severe pain over the right side of the head, attended with a throbbing and shooting through the ear. The pain was nearly sufficient to cause delirium, and too clearly indicated mischief in the more deeply-seated structures. The mucous membrane of the meatus, on examination, exhibited evident signs of acute inflammation, and was so much swollen as to conceal the membrane of the tympanum. There was no time lost in adopting active treatment. He was freely and repeatedly leeches in the neighbourhood of the ear; and warm fomentations were applied, as in such cases they are always found soothing

and agreeable. Other antiphlogistic treatment was put in force, with great relief to the urgent symptoms; but he underwent an illness of more than three months' duration, suffering from repeated formations of matter in the region of the mastoid process, and from a copious discharge from the meatus, which evidently proceeded from the tympanum, the membrane of which was seen to be perforated. The bone exfoliated, a portion of the mastoid was thrown off, and soon afterwards paralysis of the facial nerve occurred. The man ultimately recovered with a loss of hearing on the right side. The left ear was treated by simple injections, and a perfect recovery was effected on that side, the hearing being much better with that ear than it had ever been, the discharge having entirely ceased. This case is admonitory of the danger of irritating the mucous membrane when it is only slightly inflamed, and also of the necessity and advantage of prompt and active treatment when the symptoms are severe. It likewise shows how such an exciting cause as influenza may light up into serious mischief a state of disease too frequently regarded as of but little consequence, such as simple otorrhœa.

The treatment required in the early stages consists of little more than strict cleanliness, with weak astringent injections and aperients. When pain is experienced, a blister behind the ear is the best remedy. When the inflammation is severe, and the purulent discharge copious, leeches may be necessary. Granulations must be treated by escharotics, and polypi should be removed by means of the forceps; this excrescence will be treated of in a future chapter. It is too often the case that this disease is presented to the surgeon much aggravated by the treatment employed by the patient, or by the parents, or by those having the charge of children, who are too apt to stuff the ear with wool and laudanum, or other still more improper applications, with the view of allaying the ear-ache, as they term it, when it obviously requires treatment adapted to subdue inflammation, and its consequences.

The following case will illustrate the disease as it terminates occasionally in morbid granulations, in consequence of neglect in childhood, in the expectation that it would subside with advancing growth—a common error, deserving attention because of its ill consequences.

Case.—A clerk in a bank, aged nineteen, of weakly constitution, applied for relief, having a discharge from both ears, with partial deafness. He stated that from his infancy he had had a discharge from one ear, which it was expected would subside spontaneously; while on the other side the otorrhoea had existed only twelve months. Examination revealed, in the ear more recently inflamed, little more than a mucopurulent discharge from the meatus, and a redness round the ceruminous portion of the canal. This readily yielded to astringent injections and aperients, with a perfect restoration of hearing, whilst the other side became affected with morbid granulations, not only on the mucous lining of the canal, but covering the membrana tympani. The discharge was checked by astringent injections, and the granulations ultimately yielded to the application of the nitrate of silver every other day, the hearing being only partially restored. The general health was supported during the treatment by tonics and a generous diet. In these cases much will depend on attention to the general health, which is evidently at fault, when disease existing for a time in one ear, at length attacks the other.

This form of inflammation sometimes leaves the lining membrane of the meatus in a thickened condition, particularly in the neighbourhood of the ceruminous glands, so that it is sometimes difficult to pass the end of the speculum beyond that part. The epidermis is secreted in thick scales as in psoriasis, and sometimes desquamates in patches. The solution of the nitrate of silver is the great remedy for this condition; but it is essential that cleanliness and the frequent use of the syringe be attended to.

Sometimes the glandular structure of the meatus, after long-continued chronic inflammation, will throw out a

deposit, which, by its gradual increase, layer by layer, will at length form a ring around the canal, which may nearly block it up, leaving a central aperture only, not larger than a pin's head. Now as this stricture will generally be formed beyond the ceruminous circle, the above-described central aperture may easily be mistaken for a perforation in the membrane of the tympanum, so that the utmost care is necessary in the diagnosis. The degree of deafness caused by this deposit varies with its amount; the hearing may be altogether lost if the canal become blocked up. The treatment must also depend upon the extent of the disease and its results. In the milder and more recent cases it may suffice to apply leeches within the canal, followed by injections of warm water to cleanse the parts; but it generally requires a more energetic treatment, as well as surgical assistance. The case being clearly diagnosed, the best plan is to divide the strictured part in various directions, with great care, so as to loosen and break up the deposit. Then (after waiting a few days) a sponge tent may be introduced, which will gradually dilate the parts, and cause absorption of the deposited matter, without giving much pain. Meanwhile counter-irritation may be set up behind the ear, and mercury must be administered in a mild but protracted course of alterative doses. The bi-chloride, with bark or guaiacum, will prove the most eligible form. These cases will require much patience and perseverance, but, provided the internal structures are sound, they will generally so far recover, that a serviceable amount of hearing-power may be restored. The prognosis should however be guarded, inasmuch as operations on this canal may, like other sources of irritation, light up a chronic inflammation into active mischief: this possibility should be borne in mind. The following case is instructive on this head.

Case.—Jane B., aged thirty-five, presented herself at the Dispensary in 1848, having been deaf on both sides for nineteen years to such an extent, that she could not hear.

the tick of a watch unless it touched her ear. There was a copious and offensive discharge from the left ear, and the membrane of the tympanum was covered over with granulations. In the meatus of the right ear was a stricture formed of a solid deposit with a central aperture, which on first sight had much the appearance of the membrana tympani in a state of perforation. On this side the discharge was but slight. The left ear was treated by astringent injections, and the granulations were touched with the nitrate of silver three times a week ; this gradually checked the discharge, and at length considerably lengthened the hearing distance. The right meatus evidently required more active remedies, and as the patient had for many years been subjected to a variety of unsuccessful treatment, and was extremely anxious that some more efficient expedient should be tried, the author explained to her that as the internal structures were probably sound, there was a prospect of relief, if the meatus could be restored to a healthy condition. She then readily consented to any operation which might afford a chance of her restoration to society. Thinking that, from the oozing of sero-purulent matter generally going on, there might be some barrier to its free discharge, the author introduced an iris knife, and freely enlarged the perforation in the false membrane. The bleeding was very slight, and no discharge followed ; but the immediate effect of the operation was to set up active inflammation, evinced by pain in the head, delirium, and fever. These symptoms, however, yielded to free depletion and other antiphlogistic treatment. After the inflammation had subsided, the stricture was dilated with sponge tents, and the meatus was cleansed three or four times a day, until it became possible to examine the membrane of the tympanum, which was slightly congested, but presented no appearance of granulations. An alterative course of mercury with tonics was then prescribed, and after many months of persevering treatment the hearing on that side was restored, and is now much more perfect than on the other.

The *herpetic and eczematous eruptions* which so often attack the auricle in infancy and childhood, may extend into and involve the external meatus. The history of the case and the appearance of the auricle will sufficiently attest the nature of the complaint in the canal, and the treatment adopted for the one may be successfully employed for the other, great cleanliness being observed, and, after a time, a solution of nitrate of silver may be used to paint the lining membrane. As in all cutaneous affections of children, the state of the general health must be assiduously attended to, or there may be danger in curing the local complaint.

Veneral maladies may extend to the meatus in the same way that other parts of the body are affected by the poison; and the writer has seen cases that lead him to believe that the matter of gonorrhea, carelessly and negligently introduced into the passage, has set up a peculiar form of otorrhœa. The syphilitic affections, being either of the secondary or tertiary form, must be treated by constitutional remedies; the gonorrheal aural discharge must be met by antiphlogistic measures, according to the severity of the inflammation, and subsequently by astringent injections.

Wounds and injuries inflicted on the external meatus are not often met with; they are most frequently the result of surgical manipulations for the removal of foreign bodies, during which the lining membrane of the canal has been torn, and sometimes even severely injured, so as to induce sloughing; the membrane of the tympanum may also suffer from rude attempts at extraction. Lacerated wounds may also be caused by the forcing of sharp, penetrating instruments into the passage. Slight injuries may be inflicted by the use of the ear-picker or of a pin in the removal of hardened wax. Incised wounds are scarcely ever met with. When the bleeding, which is generally very free, has been stopped, the application of leeches may be required to lower the inflammation which is sure to follow the infliction of the injuries just described, and which, in bad cases, if unchecked, may become a source of danger, by ex-

tending through the middle and internal ears to the membranes of the brain. The usual antiphlogistic treatment for the suppression of inflammation should be adopted, and either warm fomentations or cold lotions applied to the ear, according as either affords relief. The exhibition of aperients is of course most necessary, and the patient should be kept quiet.

The discharge of blood by the ear-passages, independent of wounds of their lining membranes, is a symptom that may indicate a comparatively trivial amount of disease, as when it occurs from polypus or fungoid granulations, or, on the other hand, it may be a sign of very extensive and serious injury, such as fracture of the base of the skull, concussion, apoplexy, asphyxia, death by drowning or strangulation, and blows or falls on the side of the head, &c. In fracture of the base of the skull it is considered one of the principal diagnostic signs.*

Exostosis in the external auditory meatus is not of unfrequent occurrence. These bony excrescences may spring from any part of the osseous portion of the canal; they are of slow growth, and consequently the disease may have been going on for some time before the hearing is impaired, or the patient made aware of its existence, especially as scarcely any pain is experienced until the morbid growth begins to distend and block up the passage. Ultimately the hearing is lost, if the disease be not checked. The occasional employment of leeches, with the local application of iodine to the tumour, and counter-irritants behind the ear or at the nape of the neck, offer the best prospect for arresting the advance of these tumours. In a case that fell under the author's notice, iodine with a seton at the nape of the neck, kept discharging for many months, seemed to afford considerable benefit. It rarely happens that both ears are

* Dr. Barnes of Carlisle relates in the "Edinburgh Medical and Surgical Journal," 1826, an interesting case of hæmorrhage from the ear vicarious with the catamenial discharge. The author has also met with cases of bleeding from the ears, without being able to detect the slightest lesion of the organ.

thus diseased, but in the case attended by the author, both sides were affected, and permanent and complete deafness was the consequence.

Polypus in the Meatus.—These morbid growths are of sufficient importance to require the utmost attention on the part of the surgeon, as, unless they are treated effectively, they will continue to grow until the meatus is entirely obstructed, causing complete deafness on the affected side, with a foul and offensive discharge, which in some instances excoriates the skin as it escapes; while the polypus itself, acting as a foreign body, becomes the source of irritation, and often the foundation of disease in the parts in contact with it.

Polypi of the meatus are of two kinds, which the writer will denominate the *true* and the *false*. The true polypus, or ciliated epithelial growth, which Dr. Druitt has correctly called the *fibro-plastic*, grows invariably from the ceruminous glands, although it may have a second attachment in some other part of the tube. The false polypus is a fungoid growth, consisting of a number of morbid vascular granulations aggregated together, and growing from any part of the meatus or membrane of the tympanum; is frequently the result of severe otic inflammation in cachectic constitutions, and very commonly follows severe cynanche from scarlatina or some other cause. It is important to distinguish these two kinds of polypi, as they may be said to include every variety of the disease described by authors, and require very different treatment.

The *true polypus* grows from a peduncular attachment; the *false* has no distinct stalk or neck; on the contrary, its base is generally the thickest part. The former is of a pale flesh colour, insensible to the touch, and grows slowly; the latter is of a red hue, extremely sensitive, bleeds on the slightest touch, owing to its great vascularity, and grows rapidly. In the former the accompanying otorrhoea frequently diminishes, as the growth of the polypus advances; in the latter the reverse is the case, as it increases as the fungus enlarges, and the discharge is often mixed with

blood. No observant or experienced practitioner can possibly mistake the one for the other ; although the granulations springing from the healing of an abscess or ulcer may be mistaken for the granular appearance of the false polypi.

The prognosis of both kinds of polypus, if neglected, is bad, neither ever showing any tendency to a spontaneous cure ; but the author has seldom found either of them unmanageable, or difficult of cure, under judicious treatment.

Treatment of the true Polypus consists solely in its removal. This, it will be found, will be most efficiently performed by twisting it off adroitly by the forceps here delineated ; but

FIG. 12.



even this simple operation may fail, if traction be substituted for twisting. Some writers on aural surgery recommend the excision of the polyp by the knife or a pair of scissors ; others advise its strangulation by means of a ligature. Experience, however, has shown that neither of these operations can be practised with the certainty and facility with which the removal by the forceps can be effected. In many instances, indeed, excision is totally impracticable. On this account the author prefers the forceps, and advises their use. After it has been effectively removed, all that is requisite is an astringent injection, containing the solution of Goulard, or nitrate of silver, thrown into the passage for a week or ten days ; after which the disease rarely returns.

These polypi will sometimes present themselves double, in which case they must be removed separately ; it is not

an uncommon occurrence that, after a polypus has been removed from one ear, and the meatus has become sound, a discharge appears in the course of a few months from the other ear, and on examination a polypus will be detected in its meatus. Sometimes another will be found in the nose, accompanied with purulent discharge, or ozæna. In these cases of nasal polypi, after they have been removed, it is well to touch the surface of the membrane with some undiluted nitric acid on a glass probe, or to use an injection of one drachm of diluted nitric acid to half-a-pint of water, two or three times daily; this will bring the membrane into a state of health, and prevent a return of the disease.

Treatment of the false Polypi.—These fungous growths have nothing in common with polypus, except the name, which the author has conceded to them rather in compliance with custom, than from any view he may entertain as to their pathological nature and origin. The treatment must therefore be conducted on very different principles. The true polypi are merely growths, which may consist with perfect general health; and being therefore purely local affections have only to be removed, and the ulcer treated according to general principles: but the fungoid granulations are, *per se*, evidence of disordered health, and therefore all attempts at removing them without constitutional treatment must prove abortive.

It will generally be found that the patient is either of a strumous habit of body, or has recently recovered from scarlet fever, or has been exposed to some cause of debility or exhaustion, such as eruptive fevers, a severe attack of influenza, &c. Sometimes the disease commences in the tympanum, an abscess having burst through the membrane, leaving an aperture through which the origin of the fungus can be traced. These growths are far more common than the true polypi; but out of the several hundreds of cases which have come under the author's treatment, he does not remember one in which the general health of the patient was sound. It cannot, therefore, be a matter of astonishment that the local treatment recommended by writers

rarely succeeds alone. The tumour may be removed again and again by means of the ligature, the knife, or the forceps; caustic may be applied to the matrix, and the utmost cleanliness observed; but the disease will constantly return, unless the health be restored either spontaneously, or by appropriate medical treatment. The author has seen cases which have resisted local treatment for years, and have afterwards gradually yielded at length to the repeated application of a leech or two to the fungus when it is vascular and congested, with warm injections, and a course of alterative and tonic medicines; when the fungus is pale and flabby, caustic may be at once applied, and with advantage.

Case.—Master B., aged 9, had been the subject of granular polypus, with a foul, offensive discharge from the meatus of the right ear, for three years, with total loss of hearing on that side. It first appeared after a severe attack of scarlet fever. His health, although not sound, was sufficiently good to allow of his remaining at school. The cure had been attempted by extraction and the repeated application of caustic; but, though affording relief for a time, these attempts eventually failed, on each occasion, to effect the entire removal of the disease. He was brought to the writer, under these circumstances, in the spring of 1850, without any hope, on the part of the friends, that the disease could be cured, but merely that some relief might be afforded, if possible. The plan pursued was, the application of a leech twice a week to the fungus, an injection of tincture of iodine, with acetic acid and water, used three times a day, and counter-irritation behind the ear. By these means the local inflammation which sustained the disease was gradually arrested, the strength being meanwhile supported by a generous diet, and full doses of quinine and sulphate of iron. In about five months the fungus had disappeared, the discharge was arrested, and the opening in the membrana tympani, through which the fungus could be traced, had closed up; the hearing was not, however, much improved. In this case doubtless there had been tympanic abscess, which had burst into the

meatus through the membrane, to the inner surface of which probably the polypus was attached. This case will illustrate the mode of treatment generally to be pursued, although in each instance the medical treatment must be varied, according to its individual peculiarities and features.

After the inflammatory symptoms have been subdued, it may be necessary to touch the fungous growth occasionally with the nitrate of silver, taking care that no part of the canal be touched, except only the fungus. This will expedite the cure; but the improvement of the constitution, with local depletion, constitutes the great principle of treatment. These cases are always very protracted in their duration, and require great perseverance on the part of the patient, and considerable skill and great nicety of treatment on the part of the surgeon; *but they should never be abandoned as hopeless*,—scarcely even when they have their origin in caries.

In those fungous growths which arise in the meatus after scarlatina, and consequent rupture of the membrana tympani, it is not uncommon to find the throat more or less affected with granular inflammation, and the tonsils enlarged. It is in vain to expect any successful result from treatment in these cases as long as the parts about the throat, when diseased, are neglected; but this will be more fully discussed in the chapter on Diseases of the Throat in connection with Deafness.

Malignant and Cancerous Growths in the Meatus are sometimes, though rarely, met with: they are chiefly of the hematoid kind.

Case.—A weaver of middle age had twice had a fungoid tumour removed from the meatus, but it had rapidly grown again, and, when he applied at the dispensary, there had been occasional discharges of blood from the ear. He also had paralysis of the face and of the temporal muscle, his jaw being fixed. Some teeth were removed, and he was fed by suction. The tumour increased rapidly in extent; and

before the patient sunk, a malignant growth filled up the antrum on the same side.

Occlusion of the Meatus sometimes occurs in elderly people by collapse, probably from paralysis of some of the muscular fibres; this state of the parts can only be treated by mechanical means. The introduction of a tube which will fit the meatus is found of some service. Instances of this occlusion are extremely rare; but they have not escaped the notice of quacks, who have advertised the sale of their instruments as a "cure for deafness in all cases."

Malformations of the external Meatus are met with more frequently than is generally supposed. They may involve the shape, direction, length, calibre, and curves of the canal, and in either of these cases may modify the transmission of the sonorous undulations, and perhaps even render those who are thus afflicted more liable to disease of the parts. The canal may be shorter than is natural, much more tortuous, or it may be the seat of a hour-glass contraction about the centre, in which case the removal of indurated cerumen or of a foreign body, should it have penetrated beyond the contraction, will be rendered exceedingly difficult, and if the stricture be very great, probably even altogether impracticable. It must also exert some impairing influence on the powers of audition, although perhaps not very evident to the patient on account of its existence from birth. In a case where the canal was unusually short and large, the patient declared her hearing to be perfect, although from the attention with which she listened to the voice, the contrary might be inferred. The power of hearing is entirely lost in the other ear. The meatus is occasionally found full of a slimy caseous matter at birth, which, if not removed by syringing, will induce congenital cophosis, partly by the presence and induration of the matter, and partly because the nerves of the ear are not brought into activity by their appropriate stimulus—the undulations of sound, as they cannot penetrate through the blockading material. The orifice of the meatus is

sometimes found to be the seat of a congenital stricture so narrow, that the thinnest body, such as a pin, or a common probe, cannot pass through it. On the other hand, it may be preternaturally wide; it has been found nearly or quite closed by a false membrane stretching across it, and if this membrane be divided by a surgical operation, its reunion can scarcely ever be prevented, so great is the difficulty experienced in keeping it patent. The situation of the orifice is sometimes shown only by a mere depression, the meatus itself being imperforate, or a bony structure may close up the canal at the part where the cartilage terminates, and the osseous meatus should commence. The external meatus may also end in a shallow cul-de-sac, there not being any connection between it and the middle and internal ears, or else all beyond the cul-de-sac may be perfectly solid, all the elaborate and beautiful structures of the internal part of the organ being wanting, as well as the posterior part of the external meatus. A double meatus has been met with, the additional canal in that case opening behind the auricle. It is almost needless to say, that these congenital malformations are beyond the reach of art, and in many instances may be ranked among the causes of deaf-dumbness. They will be more fully treated of hereafter in a subsequent section, in which the causes of that sad and irremediable defect will be described.

As objections are entertained in practice to the deformity occasioned by the removal of any part of the body of a deceased person; and as it is impossible to conduct the minute investigations necessary to discover the congenital malformations and pathological changes to be found in the meatus, and in the middle and internal ears without the removal of the bony apparatus, a brief description of a proceeding by which the auditory process may be removed without causing any painful alteration of appearance may be of some service in the conduct of *post-mortem* examinations. First, a horizontal incision should be made in the temporal region above the free border of the auricle, down to the bone; secondly, two other vertical incisions should

be made, of the same extent as the first, *i. e.* from two to three inches in length, passing down from the first incision on each side of and inclosing the ear, so as to form the letter V. The ear is then to be dissected off, the bony table of the cranium to be pierced in the temporal region with a proper instrument, and the auditory process removed by means of a fine saw and elevator, after which the ear may be replaced, and the lips of the incisions sewn up.

CHAPTER III.

DISEASES OF THE TYMPANUM.

THE *membrana tympani* forming the division between the external and middle ears, and belonging anatomically and physiologically to both, it will be convenient, before proceeding to describe the diseases of the cavity of the tympanum, to make a few observations on the morbid appearances which this membrane may present, the mode of diagnosing them, and to point out the light which they throw upon the condition of the tympanum.

The examination of the *membrana tympani* constitutes one of the most important objects connected with the diagnosis of diseases of the ear. This membrane presents itself, as has already been described, at the extremity of the meatus, lying somewhat obliquely, so that the lower edge of the membrane in each ear approaches its fellow, whilst the upper edge slightly diverges, the plane of the membrane being directed somewhat posteriorly and downwards. If the membrane be healthy, it will be of a greyish hue, and free from any coating of wax. Through its semi-transparent structure the manubrium of the malleus will be plainly seen in its position in the tympanum approaching the membrane from above downwards, and slightly at-

tached to it in the lower third of its disc. At this point the membrane shows a slight convexity outwards, which is not perceptible however in young subjects. It should likewise be observed, that in some cases considerable opacity of the membrane is met with, the hearing nevertheless being good, and the ceruminous circle healthy. Disease of this membrane may exist either in the fibrous structure of which it is chiefly composed, or in the mucous membrane which lines both sides of it, or in all these structures together. The most common occurrence is inflammation of the fibrous structure, called by the Germans

MYRINGITIS.* This is seen chiefly in those individuals who are predisposed to rheumatism and gout, although it may occur idiopathically, or from influenza or other causes, and at all ages.

The *symptoms* of this disease in its *acute* form are, an excruciating pain in the ear, at the bottom of the meatus, seizing the patient suddenly like tooth-ache, increasing generally towards evening, aggravated by loud sounds, coughing, or swallowing, together with a sensation of fulness and "bursting" in the organ, pain and tenderness over the side of the head, the temple, the eye, and the teeth, and gradually extending towards the throat and the mastoid process, attended with fever. The secretion of cerumen is soon arrested. When the patient undertakes the treatment of this disease, or when the surgeon makes an erroneous diagnosis, and is not aware of the mischief going on, it generally happens that the disease is much aggravated by being mistaken for otalgia, and treated with heating and stimulating applications, and then, suppuration occurring, a discharge is seen to flow from the meatus, fever is set up, and after a while the tympanum and its contents become implicated, and at length disorganised,—sad results which will be treated of in an ensuing section.

Upon inspecting the meatus in the early stage of this disease, it is observed to be generally red and tumified; the

* Inflammation of the middle membrane.

membrana tympani looks injected and vascular, more particularly about the attachment of the manubrium of the malleus, which projects more than usual. After inflammatory action has existed some time, the membrane may become thickened by adhesive inflammation, and present a vascular and granular appearance, or when suppuration has taken place, a complete perforation of the membrane may often be detected, pus issuing from the aperture.

The prognosis is favourable, if the case be seen early and treated judiciously, but that rarely happens; too frequently permanent mischief ensues, and the patient remains partially deaf for life.

The *treatment* should be strictly antiphlogistic—leeches and warm fomentations; purgatives, antimonials, and mercury, pushed to ptyalism, are often necessary. Large and effective blisters should be applied behind and around the ear; and the patient should be restricted in diet, kept warm, and, if possible, secluded from noise. In many cases, where the subject is predisposed to rheumatism or gout, colchicum, administered at first in full doses, combined with opium, and given afterwards in smaller quantities, two or three times a day, will be found a most important remedy. After suppuration has taken place, great care is necessary in the treatment of the subsequent otorrhœa, the discharge of which should be freely cleansed away two or three times a day with warm water; and the edges of the aperture in the membrane, when it exists, should be occasionally touched with the nitrate of silver, in order to stimulate the granulating surface into healthy action. This should be done until the aperture has healed, and the discharge has entirely stopped, which may generally be accomplished, to the great improvement of the hearing. It will be necessary during the course of the treatment to examine from time to time the condition of the parts covering the mastoid process, both during the acute stage and subsequently. If there be any tenderness, erythema, or œdema of the integuments, it must be promptly met by a free division of the structures down to the bone. This will afford almost

immediate relief, not only to the acute symptoms, if such exist, but it will also expedite the recovery in the after-stage, and perhaps prevent the occurrence of caries.

Among the complications of myringitis, in both its acute and chronic forms, ozena, or suppurative discharges from the nose, as also polypus of that organ, and those affections of the throat which accompany influenza, may be met with.

Case.—Mr. S. consulted the author in the winter of 1853 complaining of pain in the ear and over the side of the head, which, he stated, was greatly increased towards evening, and was accompanied by otorrhœa. He first complained of the pain in the ear after he had been suffering from influenza, and rheumatism in the shoulder. The suddenness with which the pain in the ear came on induced him to believe that it was merely ear-ache, which some hot application might relieve, and he sent to a druggist for something to apply to his ear; a mixture of laudanum and spirit of camphor was sent, which he was to pour into the ear-passage; but after applying two or three drops only, the pain was increased so as almost to induce delirium, and it lasted through the night, although active means were taken to subdue it: finally, the acute pain continued until the membrane of the tympanum burst, and then he got relief. A week after this the author saw him. He had then a profuse discharge from the meatus; and, upon inspecting the membrana tympani, it was observed to be red and swollen, and perforated below the insertion of the manubrium—the edges of the aperture were jagged. There were also great tenderness and pain over the mastoid process, the integuments covering which were œdematous and congested. The patient likewise suffered from severe nocturnal pains in the head, and from ozena, and polypus of the nose. A large incision was made down to the mastoid process, which gave a free passage to some purulent matter. The meatus was directed to be cleansed three times a day with an astringent lotion; the polypus was afterwards removed from the nose, and he was directed to take half a drachm of the

wine of the seeds of colchicum at bed-time for a week, together with purgatives, and to undergo a course of mercury. The edges of the perforation in the membrane of the tympanum were touched occasionally with the nitrate of silver; and in the course of six weeks the aperture was closed, the discharge had ceased, and a fair amount of hearing was restored.

This case shows the bright side of the picture; the result is too often very unsatisfactory, either from neglect or from mal-treatment. The case is also instructive, as showing how easily inflammatory action in this sensitive membrane may be seriously aggravated by stimulating applications.

A question arises, Whether it would not be better to make a timely incision into the membrane, than to allow it to burst. This practice has been adopted by the author in several cases in abscess of the tympanum, and in one instance, when it arose from scarlatina, with a successful result. The operation was proposed by the late Mr. Saunders, in his excellent work on the Ear, as a mode of procedure not only most likely to prevent ulceration, but as tending to restore the patient to health, without, as too often happens, endangering the ultimate safety of the membrane. It does not appear however that Mr. Saunders ever performed the operation himself, nor indeed does it very frequently happen that the surgeon is consulted until after the membrane has partially given way; but, even when ulceration has occurred, it is sometimes important to enlarge the opening.

The Chronic Form of Myringitis being less marked by the urgent symptoms of inflammatory action, has been frequently mistaken for nervous deafness, the pain being far from acute, and frequently intermittent, and the most prominent symptom being the imperfection of hearing. There are also a stuffing of the nostrils, headache, tinnitus, and other symptoms commonly imputed to nervous affections of the ear. The throat also generally presents a granulated surface from the enlargement and prominence of the follicular glands; the tonsils often participate in the disease,

one or both being enlarged, and the Eustachian tubes are more or less obstructed ; but the principal diagnostic signs are to be discovered by the speculum, which will show a deficiency or a total absence of the cerumen, a red and granular appearance of the mucous lining of the meatus, a thickened condition of the membrane of the tympanum, particularly in those who have suffered from sore throat, a collapse of the membrane, which is drawn inwards, presenting externally a concave surface, and showing the manubrium of the malleus with unusual distinctness. In this case the inflammation generally commences *within*, probably in the throat or Eustachian tube, and thence extending to the tympanum, terminates, as Mr. Wilde supposes, in the deposit of lymph in and about that cavity. The author has frequently seen this condition of the membrane following follicular disease of the throat, and chronic rheumatic affections of the ear. It is very common in persons in weak health, particularly in chlorotic females, and in the inhabitants of damp and miasmatic localities. The deafness and tinnitus may often be observed to remit as the weather changes, the patient hearing better in dry, clear weather, and *vice versa*. For this reason the patient is apt to defer seeking advice until the disease has become incurable, the adhesive products of inflammation being organised. This may occur in both ears, and, as a consequence, there will be a permanent imperfection in hearing. This is a very common form of deafness, and deserves special attention ; because, if the practitioner, without having instituted a careful examination of the meatus and throat, hastily concludes that the symptoms are those of impacted wax, and forthwith adopts indiscriminate syringing, or, what is worse, meddlesome probing, the probability is, that in consequence of the structural changes which the parts have undergone, much mischief will result. The author has seen inflammation re-established by even the gentle use of the syringe in such cases.

The *treatment* of this disease must be directed principally to correct the state of the general health, and to the condi-

tion of the structures about the throat and fauces, as this frequently indicates the morbid changes going on both in the Eustachian tube and within the tympanum; but it is seldom, if ever, necessary to examine this tube by the catheter. The local treatment from which the author has found the most benefit, when, as generally happens in connection with this form of deafness, a granular appearance in the mucous membrane of the throat is met with, is a frequent fumigation of the throat with iodine and guaiacum, followed afterwards with the use of an astringent gargle. The meatus should be kept moistened with the steam of warm water, and at night a little nitrate of mercury ointment dissolved in almond oil dropped into the ear-passage.

The constitutional treatment will vary according to the condition of the general health. In some an alterative course of mercury is required, whilst in others tonics and even stimulants may be necessary. In cases where the deafness is decidedly intermittent, quinine, in large doses, may be of essential service. The salt sponge bath, with friction afterwards, is an adjuvant that should never be omitted. The effect of the remedies employed, which must be adapted to the peculiarities of the case, must be watched by a frequent inspection of the meatus as well as of the throat: the re-formation of the ceruminous circle is a sign of returning health; but this must not content the practitioner unless the throat also assume a normal appearance, and the Eustachian passage become more or less free, which can be ascertained without using the catheter, by substituting a much more simple instrument, the *Otoscope* (see p. 21). This instrument, invented by the author, is a sort of flexible stethoscope, one end of which, expanded into a hollow bell, is put over the patient's ear, so as to inclose the whole auricle, the other end is to be passed into the meatus of the surgeon; then, if the patient be desired to close his nose and mouth firmly, and whilst so doing to make an effort as in blowing the nose, or as in swallowing, the surgeon may hear the shock of air against the membrana tympani, provided the Eustachian tube be pervious; a

squealing or gurgling sound will be heard if the tube contain purulent matter or other fluid. Yet, as some patients cannot easily attain the knack of inflating the tympanum, it must not be hastily concluded that the tube is stopped. Under such circumstances a very cautious introduction of the Eustachian catheter may be necessary and useful. If the original mischief have been remedied by the before-described treatment, this operation will be easily managed by the surgeon, and will, if carefully performed, give no inconvenience to the patient. It is requisite however always to recommend this procedure with reserve, as the author has so frequently been consulted by patients in whom its performance has produced great pain, and a discharge of blood at the time, and even for some days afterwards, with or without subsequent inflammation. It would appear under these circumstances that an operation, sometimes useful and necessary, had been adopted without carrying out that previous treatment, which, by improving the condition of the parts, would have rendered it safe and easy to perform.

OTITIS MEDIA.

Writers upon aural surgery have made several divisions or species of inflammation affecting the cavity of the tympanum, independent of the causes which may give rise to it; as the inflammation usually commences in the lining of the mucous membrane, Kramer has arranged it under two heads, viz. inflammation of the mucous membrane with mucous accumulation and that of the sub-mucous tissue,—distinctions corresponding to the catarrhal and purulent internal otitis of Itard; besides which, Kramer also mentions a form of sub-acute inflammation of the mucous membrane, this variety occurring without the extension of the inflammatory action to the surface of the mucous membrane itself. Saunders divided tympanal inflammation into three stages, without attempting to intimate any subdivisions of the disease itself: 1st, a simple puriform dis-

charge ; 2nd, a puriform discharge complicated with fungi and polypi ; and 3rd, a puriform discharge with caries of the osseous walls of the cavity. These three stages or states are simply the consequences of a more or less protracted subacute or chronic inflammation of the parts.

In practice it will be found that these several varieties of inflammation cannot be duly traced and accurately defined ; all that can be ascertained is, that the disease may exist in a greater or less degree of severity. Pilcher observes "that there are two varieties of tympanal otitis ; one slow in its progress, comparatively mild in its symptoms, and frequently recovered from : the other most severe, rapid, and generally destructive, either to the tympanum or to the life of the individual."

The term "otitis" may be held to include inflammation of the labyrinth or of the other delicate structures of the internal ear, as well as of the tympanum, but as the symptoms which should indicate the existence of that disease in the acute form at least, in the internal structures of the ear, are not such as can be readily discernible so as to establish the diagnosis between the two seats of inflammation, and as the mode of treatment must be essentially the same, it will be perhaps the better plan, at all events at present, to confine the use of the term to tympanal inflammation.

The causes which are apt to induce an attack of otitis are cold, the extension of inflammation from the tonsils or fauces through the Eustachian tube or from the external ear, the membrana tympani, or from the mastoid cells, the exanthematous diseases, injuries of the membrana tympani with or without a lacerated wound thereof, mechanical irritation of the Eustachian tube, the application of irritating medicines to the external meatus, the membrana tympani being ulcerated or destroyed, draughts of cold air along the meatus, and the extension of disease from the brain. As is the case with inflammation of the external ear, tympanal inflammation is said to alternate with ophthalmia, and in some cases to have been excited by the sudden suppression of a long-continued discharge from a distant part of the

body. Loud noises, such as heavy cannonades, have, it is said, led to the outbreak of this disease; scrofula, syphilis, and exhausting maladies act as predisposing causes.

The more violent form of tympanal inflammation sets in with intense pain in the ear, which may persist for a few hours only, or, with some exacerbations, for several days; it is usually mistaken for ear-ache, and neglected accordingly. After the lapse of some time the pain involves the whole of the affected side of the head, or intense hemi-crania may usher in the disease with fever and all its attendant symptoms, a flushed and anxious countenance, eyes injected, great intolerance of light, skin hot and dry, pulse quick and hard, the bowels torpid. As the inflammation advances the pain becomes more and more severe, extending over the whole head, but the seat of the greatest suffering is at the bottom of the external meatus; it is aggravated by the slightest noises, by the motions of the jaw, and by attempts at swallowing. The fauces and the brain appear to become involved in it, and the faculty of hearing is so far affected that the patient complains of the most distressing tinnitus. During the height of the inflammation and of the attendant fever, delirium sets in and signs of meningitis occur.

The symptoms are generally less severe towards morning, but experience an exacerbation, with rigors, as the evening draws on. Deafness on the affected side is a natural consequence of the malady. Meanwhile the inflammation spreads to the lining membrane of the mastoid cells, the integuments covering which feel hot and painful on pressure, and also to the pharynx and tonsils, if not the original cause of the attack through the Eustachian tube. The external meatus on examination is found to be free from disease, or but slightly injected, from the contiguity of the malady; the diagnostic sign between external and tympanal otitis is the period at which otorrhœa occurs after pain is first complained of. The muco-purulent discharge will show itself in a few hours, or at most in a few days, in the external variety of inflammation, whereas in the tympanal

inflammation many days—a week, or even two or three may pass away ere pus is discharged, owing to the resistance of the membrana tympani, or of the thickened membrane of the Eustachian canal, or again, of the osseous parietes of the mastoid cells, by either of which routes it may make its way externally, but most usually by rupture or ulceration of the drum of the ear. When suppuration has taken place in the mastoid cells, the integuments covering them become of a dark livid colour, and frequently present an indistinct fluctuation; the matter contained therein, which is generally very offensive, streaked with blood, and contains broken-down exfoliated cells, will be discharged, if not by the aid of surgery, by ulceration, or in some very bad cases by sloughing. The small bones of the ear may come away at this time through the ulceration in the membrana tympani, but they are usually retained till a later period of the disease.

Sometimes the more distressing symptoms are greatly relieved when the discharge takes place, especially if it be at all free, but it often happens that the ulceration in the membrane is unable to afford it a full issue in consequence of the consistence of the matter, or of a portion of coagulated fibrin, or of one or more of the small bones becoming entangled in the aperture. When the pus escapes through the Eustachian canal, it may be discharged in a large quantity at once, as if a tonsillar abscess had burst, or it may gradually and constantly drain away into the throat, and thus keep up a degree of irritation there and of nausea in the stomach, into which some of it must pass. Of the three routes by which the suppuration of the tympanum may be evacuated, that by the Eustachian canal into the throat is the most favourable, as, if it occur by either of the other two, the safety of the ossicula is endangered, and an obstinate otorrhœa with deafness may continue for years, and perhaps for life.

The symptoms in most cases before suppuration has occurred may be complicated by others indicating extension of the inflammation to the membranes of the brain,

or to the cerebrum itself. The delirium and fever will then be greatly heightened for awhile, after which the unhappy sufferer may become comatose. In some cases death is caused directly by the inflammation of the membranes of the brain or by phrenitis, in others by suppuration between the cranium and the membranes, or between the membranes, or by an abscess in the brain itself. It is usually found, on a *post-mortem* examination taking place, that the posterior wall of the tympanum has been destroyed by necrosis or caries, and that thus the inflammation has become intracranial.

While on this subject,—the extension of the inflammation to the membranes of the brain, the writer would refer to a paper published by Mr. Toynbee in the "Royal Medical and Chirurgical Transactions," entitled, "Some Observations on the Pathology of those Affections of the Ear which produce Disease in the Brain."

In this communication the author has a twofold object: the first is, to point out the nature of the several affections of the ear which produce disease in the brain; and the second, to show that each of the cavities of the ear has its particular division of the encephalon, to which it communicates disease. Thus, that—1. Affections of the external meatus and mastoid cells produce disease in the lateral sinus and cerebellum. 2. Affections of the tympanic cavity produce disease in the cerebrum. 3. Affections of the vestibule and cochlea produce disease in the medulla oblongata. 1. In speaking of the external meatus, its intimate relations with the lateral sinus and cerebellum are pointed out; the affection most frequently producing disease in these parts is shown to be catarrhal inflammation of its dermoid layer, one of the numerous diseases which have hitherto been classed together under the term otorrhœa. This affection of the external meatus is fully described; and it is shown that it is found to endure during many years, without the presence of pain, or any other symptom calculated to apprise the surgeon of the presence of a formidable disease, while the bone may be becoming slowly carious, and por-

tions of the dura mater and cerebellum disorganised. In the second division of the paper, the tympanic cavity is described to be the part of the ear from which disease is most frequently propagated to the brain. This circumstance is accounted for, firstly, by the great liability of the mucous membrane of the tympanum to undergo pathological changes; and, secondly, by the existence of very intimate relations between this membrane and the dura mater. The affection of the tympanum which most frequently produces disease in the cerebrum is chronic catarrhal inflammation of the mucous membrane, an affection thus far only known as an otorrhœa. The four changes in the dura mater and cerebrum produced by the affections of the tympanum are—

1. Inflammation of the dura mater, and its separation from the surface of the petrous bone by serum.
2. Ulceration of the dura mater, and its complete detachment from the petrous bone.
3. An abscess in the substance of the cerebrum.
4. Undefined suppuration of the substance of the cerebrum.

The third section of the paper is devoted to the consideration of the labyrinth, and it is shown that purulent matter in the vestibule or cochlea sometimes causes disease of the auditory nerve, which is transmitted to the medulla oblongata, producing suppurative inflammation of the meninges and death, without the presence of any caries of the bone. In the course of this paper Mr. Toynbee shows the necessity of abolishing the use of the term otorrhœa, and of employing in its place the names of the several diseases, eight in number, of which a discharge from the ear is one of the symptoms. In conclusion, the facts which he is desirous of impressing upon the minds of medical men are, the bone, dura mater, and substance of the brain may be slowly undergoing disorganisation, without the presence of any other symptoms calculated to reveal to the medical man the existence of formidable disease, than the presence of a discharge from the external auditory meatus; and

that consequently no person suffering from catarrhal inflammation of the dermoid layer of the meatus, the membrana tympani, or of the mucous membrane of the tympanum, can be assured that disease is not being prolonged to the temporal bone, the brain, and its membranes; and that any ordinary exciting cause, as an attack of fever or influenza, a blow on the head, &c., may not induce the appearance of acute symptoms, which, as a general rule, are speedily fatal. Appended to the paper are tables, giving the particulars of sixty-five cases of disease extending from the ear to the brain, in which tables the duration of the chronic and acute symptoms, and the *post-mortem* appearances, are concisely detailed.

"Some practitioners," Mr. Saunders says, while treating of otorrhœa, "are disposed to regard this as a trivial disease; others, as one too dangerous to allow the interference of art. Both are in error. It is without doubt a disease, destructive in its tendency to the faculty of hearing. It rarely stops until it has so much disorganised the tympanum and its contents as to occasion total deafness. On this account it demands the most judicious attempts to arrest its progress, and these attempts are free from danger. How the contrary opinion should have prevailed is unaccountable; yet many modern practitioners condemn all attempts to cure it. But what argument can be adduced against the cure of this disease that is not equally conclusive against all others? Is any one an abettor of the obsolete humoral pathology? He will contend that the stoppage of a drain which nature has established is pernicious, and the morbid matter will be determined on the internal parts; but how can such a person venture on the treatment of any disease, even the healing of a common ulcer? Some years ago I thought this absurd doctrine had been totally exploded, and yet I constantly hear it adduced to deter patients from interfering with this discharge. Is a child the subject of it—the parent is told it is best to leave it to nature, and the child will outgrow it. Is it an adult?—some other subterfuge, equally

futile, is employed. The truth is, the disease is always tedious and difficult, and not always curable, and many are disinclined to embarrass themselves with the case who have not candour to make the true statement. Thus patients are induced to refrain from all attempts until the disease, in its first stages often curable, becomes absolutely impracticable."

He further sets aside the ignorant and vulgar objection that the brain may be affected by cautious and careful interference. These observations of Mr. Saunders, referring to ordinary cases of otorrhœa, are equally applicable to the management of that symptom when it is the result of the extension of inflammation from the throat to the middle ear, as a sequence of scarlet fever, or of any other disease.

"The brain can only be injured by the exposure and ulceration of the dura mater; and the application of substances capable of destroying the bone and dura mater can only be an act of madness or of the grossest ignorance. But injury of the brain is more likely to result from the continuance of this disease, than the judicious interference of art. For the puriform discharge naturally advances to ulceration, and ulceration to denudation and caries of the bone, and separation of the chain of bones. A caries of the tympanum is therefore ultimately produced. But this will destroy the bone and expose the dura mater; and if it were not for that principle by which membranes that line cavities thicken as the neighbouring parts are ulcerating, and thus preserve their integrity, the brain would perhaps always suffer in the ultimate stage of the puriform discharge from the tympanum."*

The treatment of a disease so violent in its nature, and so rapid in its progress to the destruction of the organ, if not of life itself, must be decidedly of the most active anti-phlogistic character, unless it be contra-indicated by the causes which induced the attack. The most active and

* Saunders, *opus cit.*

decided measures should be pursued in cases where cold, draughts of easterly winds, mechanical or medicinal irritants, the extension of inflammation from the vicinal parts, or from exanthemata, where they have not exerted a too depressing influence, &c., have led to the attack of otitis; but in those instances wherein there exists a peculiar *materies morbi* in the system, where there is a syphilitic or scrofulous diathesis, or when the inflammation is set up as a consequence of the suppression of long-continued discharges, or as an alternative of other inflammations, or of very exhausting and debilitating diseases, it will be necessary to modify the activity of the treatment to be pursued, according to the special influences of the respective causes.

In the former class of cases blood should be abstracted from the arm or from the jugular vein, and also by leeches or cupping near the inflamed organ, the latter operation being repeated from time to time, according to the severity of the symptoms, the exigencies of the case, and the state of the constitution. The free exhibition of cathartics to remove the torpor of the bowels, and act also as derivants and counter-irritants from the head, should be adopted early, and maintained as long, at least, as the evacuations indicate an unhealthy condition of the excretions; diuretics, in like manner, may be serviceable, as may also diaphoretics, and all other medicines which tend to correct and increase the quantity of the secretions without undue stimulation. Local counter-irritants, and blisters to the side of the head and behind the ear have been recommended; while in cases where the inflammation runs very high, and threatens to induce its most dangerous consequences, after the bleeding, purging, &c., mercury should be thrown rapidly into the system, so as to induce its peculiar action, as evinced by foul breath, subacute gencivitis, loosening of the teeth, ptyalism, &c. The side of the head may be freely fomented during the otitis; but if the brain or its membranes should become implicated, it will be advisable to have the head shaved, and cold, evaporating

lotions kept constantly applied, unless the intensity of the symptoms indicate the necessity of blistering the entire scalp. The occurrence of this most unfortunate and exceedingly dangerous complication necessitates the having recourse to an activity of antiphlogistic treatment not previously employed, provided there be reason to hope that the constitution may bear up against it; if not, the bleeding, purging, &c., should be pushed to the utmost verge of safety, and some dependence placed on the effect of blister and counter-irritants employed at a distance from the seat of disease. Sinapisms to the feet and calves of the legs; mustard foot-baths, blisters applied freely to those parts, and even in very bad cases indeed, where sensation and motion are lost in coma, the Carlisle vesicant may be had recourse to, as in the last stages of poisoning by opium, as a *dernier ressort*. It consists in the application to the parietes of a flat iron previously dipped in boiling water; the vesicant powers of this remedy are very rapid, unless the vital strength be too far sunk. A seton at the nape of the neck will often afford great relief.

When suppuration has occurred in the cavity of the tympanum, evidenced by rigors and an aggravation of all the symptoms, the aural surgeon should seek, above all things, the readiest way to effect its evacuation, in order to prevent decomposition of the fluid and caries of the osseous parietes of the tympanum, and the extension of the inflammation to the membranes of the brain or to the brain itself. When the cavity of the tympanum is filling with pus, an examination of the external meatus will show that the membrane has lost its concave appearance to a great extent, is more or less opaque, and may even, if the collection of pus be large, have become somewhat convex. If the mastoid process be also the seat of a purulent secretion, that region will be hot and inflamed, the integuments swollen, injected, tender to the touch, and inflamed and perhaps, as the result of caries, some degree of indurated tinct suppuration may present itself.

It has been already remarked that the most favourable

mode of exit for the pus secreted in the tympanum, &c., was through the Eustachian tube, as such a passage afforded a greater prospect of safety for the ossicula, and consequently for the function of hearing. That it usually happens that early during the existence of tympanal otitis, the Eustachian canal is blocked up by the tumefaction of its lining membrane, which usually attends inflammatory action of that part, that lymph is thrown out, and consequently that for a time the tube is more or less completely closed, so that it is but in very rare cases that the discharge in tympanic inflammation escapes by the throat either in a gush or by draining. This must be considered a very exceptionable mode for its exit, and one that cannot be looked forward to without anticipating a large amount of disease in the organ; indeed such a mode of discharge is of very rare occurrence.* Failing this, there remain the two other routes—by the meatus externus, through ulceration, rupture or sloughing of the membrana tympani; or, through the mastoid cells, the suppurative inflammation already set up in them proceeding to caries and exfoliation of the cells, the pus making its way in the usual manner through the integuments, either by ulceration or sloughing, and thus being discharged by various small, or by one, two, or three larger openings, together with various portions of the bone. By either of these methods however the safety of the ossicula auditus is materially endangered, and sooner or later they come away with the discharge.

Any surgical operation, such as *Catheterism* of the *Eustachian tube* to render it patent again, when more or less closed under the circumstances described, cannot fail to be the cause of great mischief, by re-lighting up or by extending the already-existing inflammation, while it is evident, that when the otitis has already advanced so far as to cause an obstruction of the Eustachian tube, there must be such an amount of disease in the tympanum as to insure

* Occurring once only in fourteen cases.

may be best described by considering what is requisite to be done in the three different stages. 1. When the exanthematous fever is at its height, and the inflammation may be supposed to be on the point of terminating in suppuration. 2. When the indications that suppuration has taken place are undoubted. 3. The otorrhoeal stage, after the membrana tympani has been perforated.

In the first stage the treatment requires great judgment; for we have, on the one hand, to contend with an active form of inflammation which, if not arrested, speedily runs a destructive course, while on the other, the patient is suffering from an exanthem which too frequently assumes a low type, and in which the powers of life sometimes sink very suddenly. It is desirable of course to arrest the local inflammation which endangers the ear, by vigorous depletion, fomentations, and the exhibition of antimonials; but it is still more important that these measures should not be carried to such an extent as to peril life, or exhaust the vital powers. Local depletion (by leeches to the mastoid process and anti-tragus) should therefore be preferred to the general abstraction of blood: they should be applied as soon as the pain becomes severe in the tympanum, and their application should be repeated from time to time, as the strength of the patient and the urgency of the case may seem to indicate. This is the principal remedy; but if the pulse be firm, and the type sthenic, the use of purgatives and antimonials may accompany the leeching, and if the inflammatory symptoms still persist, the treatment proper for the *second* stage, of which we are now about to speak, must not be delayed a single hour.

In the second stage, in which suppuration has commenced, this event is indicated by increased severity of the pain, which becomes darting, shooting, and throbbing, and sometimes may cause actual convulsions with delirium. Rigors occur from time to time; there is a sense of bursting in the ear, and on examining the meatus, it is observed to be of a livid red colour, and the membrane of the tympanum congested and prominent, resembling red velvet.

Under these circumstances the life of the patient, as well as the organ of hearing, may be considered to be in great danger, caused partly by the purulent matter being pent up in the tympanum, from which it cannot escape through the Eustachian tube, as that canal is already blocked up, so that it must make its way by a process of ulceration and sloughing, either through the membrana tympani, the mastoid process, or through the Eustachian tube, as has been already stated in the preceding remarks on otitis. The retention of the matter in the tympanum often causes great mischief, because while the pus is ulcerating its passage externally, it may also set up the process of necrosis or caries in the posterior wall of the tympanum, and thus, travelling towards the meninges, light up a suppurative inflammation in the membranes of the brain, or in the brain itself—a proceeding to which it has been shown these parts are exceedingly prone, and which in the great majority of instances is fatal to the organ of hearing, and very frequently to life itself. Here then is a case in which the common principles of surgery suggest the simple and effective remedy of puncturing the membrane, and liberating the fluid, before the sloughing process commences. This simple practice is open to no conceivable objection, and it cannot be doubted that if it were more generally adopted, much after mischief as well as present danger might be avoided. The author had an opportunity in 1851 of putting this expedient into practice.

Case.—Two children, sisters, were brought to the author for his advice; they were both suffering from otorrhœa and deafness, with perforated membrane on each side, the result of a recent attack of scarlatina. A brother, nine years of age, had been sent into the country to be out of the way of the contagion. The author requested that he might have early tidings if this child were attacked, which took place on his return home a week or two afterwards. The child was delirious, and suffering extreme agony in the ear. On examining the meatus, the canal was much narrowed, and

dilating it with the bi-valve forceps showed the membrane of the tympanum red and swollen. Placing the cases of the two other children (who were suffering so much from the same cause) before the parents, the author obtained permission to puncture the membrane, an operation which he had long determined to perform on the first opportunity, being anxious, if possible, to prevent the misery he had so often witnessed. This was now performed on both ears with a broad-shouldered cataract needle. Upon withdrawing the instrument it was seen to be besmeared with purulent matter, and although there was not any immediate copious discharge, yet in a few hours matter was seen to run freely from the meatus. The child expressed himself as much relieved by the operation, and the result was highly satisfactory. The discharge continued for two or three weeks, and then ceased. The aperture closed on each side, and not the slightest imperfection in hearing is discoverable; whereas both the sisters are slightly deaf to this day, and have not yet got rid of the otorrhœa. The author has since repeatedly opened the tympanum in cases of suspected accumulations of matter from other causes, and has seen no reason to regret taking this step, as in every case the membrane has healed so readily that a repetition of the operation has been sometimes needful.

Itard and the late Mr. Saunders lend the whole weight of their authority in favour of this operation, although the latter does not appear to have had an opportunity of performing it. The following quotation will explain his views:—

“But let it be admitted that the tympanum has suppurated, ought the membrana tympani to be abandoned to a casual ulceration, or is it better to open it by art? I am inclined to prefer the latter; and if I could be assured by any symptom that suppuration has taken place, I should not hesitate to make a small perforation of the membrana tympani, and to repeat it if necessary, taking at the same time every precaution to suppress the fresh collection of matter.

“If this mode of treatment were followed, it would be

practicable to evacuate the matter, and cure the complaint with trifling injury to the membrana tympani, which is generally sacrificed in a spontaneous discharge."*

This operation, by allowing the discharge of the pus secreted in the cavity, besides affording immediate relief to the sufferer, and preventing as far as possible the extension of the disease by caries, will enable the surgeon to adopt other important measures in the treatment of the otitis, and also, by displaying the real nature of the case, will prevent the stuffing of the meatus, with wool soaked in medicinal and other stimulants, &c., one effect of which would be to re-excite inflammation, and another, equally injurious, to oppose the draining away of the matter.

The third stage of the disease, in which otorrhœa is fully established, and the membrane of the tympanum partially or entirely destroyed, with danger of caries to its osseous parietes, requires much more attention from the surgeon than is generally bestowed upon it; as it is generally capable of much amelioration by both local and general treatment. The local treatment should be as follows:—The meatus should be cleansed out gently by a tepid astringent injection of the acetate of lead, used two or three times a day, and a blister should be applied occasionally behind the ears. The general treatment consists in improving the health by tonics, alteratives, and aperients, to which may be added the occasional use of the warm bath.

It is possible that even in the most unpromising cases, the otorrhœa may cease, the aperture in the membrane may heal, and the disease may thus be cured. The author has had the opportunity of seeing many cases which have terminated thus. The manner in which recovery takes place is thus described by Saunders:—

"When the disease is cured, the healing process is effected by the extension of the cutis of the meatus into the tympanum, and its becoming continuous with its membranous lining. I have a preparation, a dissection of the ear, in which half the membrana tympani had been de-

* Saunders on the Ear.

stroyed as far as the manubrium of the malleus, around which the cutis of the meatus had grown and joined the lining of the tympanum."

There is a vulgar error, alluded to elsewhere, that otorrhœa from any cause should not be interfered with, from the dread of causing disease in the brain or in some other important organ, from the drying up of an old discharge; but the fact is, that what we have to dread, is not the mischief which may arise from surgical or medical interference, but the consequences of the disease itself if neglected.

The following extract from Dr. Druitt's most valuable work, "The Surgeon's Vade Mecum," will at once place the subject in its true light, and point out what is most to be feared:—

"Inflammation of the dura mater with effusion of greenish-yellow fibrin; abscess within the brain; plugging of the sinuses or jugular vein with dirty-looking fibrin, from the entrance of fetid secretion into them, and general pyæmia, may be the consequences of ear disease, just as they may be of fracture of the skull; and the observations we have made on the insidious approach of mischief within the head in the one set of cases, apply equally to the other. The following case may be an example:—'June 2, 1848. The writer was consulted by a female servant for intermittent pains about the side of the head and face. She looked out of health; intermittent neuralgia was prevalent, and without further inquiry quinine was prescribed. July 5th, she was seen again. The pain had become more severe and frequent, particularly at night, and she looked ill and complained of ear-ache and discharge, which on inquiry it was found that she had been at times subject to. Purgatives and leeches were prescribed. Next day the ear was easy, but the pain had removed to the top of the head. 7th. A distinct cessation of pain in the morning, but pulse 120, tongue yellow, some delirium, and a shivering fit. Leeches, calomel, and opium. 8th. Pulse 100, pain in the head or ear. 14th. Vomiting returned. 15th. Convulsions and death.' The

student must be prepared in any such case for the intermittent character of the pain, and for the absence of direct symptoms ; but a high pulse, dry or yellow tongue, and vomiting, are suspicious. If anything could have saved this patient, it would probably have been a free incision down to the mastoid bone."*

The symptoms which indicate the extension of the inflammation and its consequences to the brain, have been already briefly described. After those which mark the presence of otitis have existed a longer or shorter time, according to the severity or mildness of the inflammation, sometimes prior to, but not unfrequently after otorrhœa has been established, the febrile excitement becomes greatly increased, the pain and heaviness in the head are much aggravated, skin hot and burning, pulse small, sharp, and quick, tongue furred, delirium high and violent, or low and muttering, the discharge from the ear sometimes diminished or altogether suppressed, pupils dilated, with low, continued moaning, sometimes with convulsions or paralysis—in short all the symptoms of severe cerebritis or meningitis set in, complicated with those of tympanal otitis and otorrhœa. A patient in this condition may be considered as almost beyond the reach of art ; coma soon sets in, and the sufferer sinks rapidly.

If the surgeon should not be called to such a case until the symptoms of brain affection have showed themselves, it will be advisable to inquire closely into the history of the case, lest a sympathetic inflammation be mistaken for one of idiopathic origin.

Dr. Graves relates a case very much in point, showing the difficulty occasionally met with in forming a correct diagnosis in these diseases. He says:—

"A patient, after exposure to cold, is attacked with symptoms of fever ; she has headache and restlessness ; she then begins to complain of acute pain in the ear, darting inwardly towards the brain ; and finally is seized with sudden vomiting. Under these circumstances it is not

* Druitt's " Surgeon's Vade Mecum."

difficult to form a diagnosis, and there can be little doubt but that the phenomena here presented are indicative of incipient inflammation of the membranes of the brain. It is not easy to say whether, in such cases, the inflammatory affection of the membranes precedes the external otitis, or whether the inflammation commences in the external ear, and spreads inwards, though I am inclined to adopt the latter supposition, and the circumstance of the fever and ear-ache arising from cold seems to give an additional degree of probability to this view of the question."

During the progress of caries of the bony structures, even before the disease has advanced to the membranes and to the brain, more especially when the parietes of the aqueduct of Fallopius are implicated, neuralgic pains in the face, inflammation of the eye, convulsive motions, and ultimately paralysis of the muscles of that side of the face take place, owing to lesion of the trunk of the facial nerve. According to recent investigations, and to the opinions of Itard and Lallemand, this part is very frequently the seat of caries of the internal ear; in fact it is rare to find, on dissection, in many cases, these parts otherwise than destroyed or absorbed after any lengthened, diseased, and neglected action of the middle and internal ears has existed.

As showing how much the middle ear becomes affected in inflammations of that organ, it will be only necessary to observe how frequently the mastoid process is the seat of caries, the cells probably becoming infiltrated, and the periosteum inflamed; it is the part most usually affected in this purulent otorrhœa. This part of the ear soon becomes painful on pressure, and the integuments œdematous.

Occasionally the process will be absorbed by the diseased action within, when the matter will burrow down among the muscles of the neck, and even set up disease in the spine.

Master B., at the age of seven years, had several attacks of ear-ache, succeeded by a discharge of matter from the meatus; the pain at this period was generally referred to

the side of the head and behind the ear; but from his occasional drowsiness after each attack it was supposed to indicate some mischief within the cranium; a severe attack of rheumatic fever followed, with all the usual symptoms of the joint affections. An enlargement of the integuments over the mastoid process was observed during this period; the swelling gradually extended down the nucha, and ultimately affected the spine, so as to cause some distortion of the neck. The head was drawn to one side, thus showing that the disease was not within the cranium, as was at first supposed, but was an example of spinal disorder. Some time elapsed; and during the treatment of the disease (which was occasionally suspended), several medical men were consulted, each and all not allowing the case to have any reference to a diseased condition of the ear. The writer saw this boy several years afterwards. The mastoid process was greatly diminished in size; in fact, it was flattened, as compared with the opposite one. There was considerable discharge from the ear, and the head was fixed to one side, with partial paralysis of the face. In this case it may be fairly presumed that if an early opening had been made over the mastoid process for the discharge of the pus, it would have prevented the burrowing of the purulent matter among the muscles of the neck, from the effects of which this poor lad suffered so long, and might also have prevented the annoying consequences which, in this instance, there is every reason to believe will be permanent.

Dr. Abercrombie alludes to a similar case in his work on the brain :—

“A young lady in Edinburgh, several years ago, after the usual symptoms indicating cerebral disease, had lain for three or four days in a state of perfect coma, and her situation was considered as entirely hopeless. Her medical attendants, on paying a visit as a matter of form, were astonished to find her one day sitting up and free from complaint; a copious discharge of matter had taken place from the ear with immediate relief, and she continued afterwards in

good health. It is however by no means certain, that in such a case as this the discharge came from the cavity of the cranium ; for there is reason to believe that extensive suppuration within the cavity of the tympanum is capable of producing symptoms of great urgency, especially if there should be any difficulty in its finding an outlet. In a case of this kind, recorded by Itard, the matter, after the occurrence of urgent symptoms, escaped by the Eustachian tube, and, by constantly dropping down in that direction, produced cough and great irritation of the larynx ; after partial relief in this manner, the symptoms in the head and in the ear returned, and were at length relieved by the puncture of the membrana tympani, by which a permanent and free issue for the matter was established."

Lallemand points to the importance of examining the mastoid process in all cases, and if any tenderness on pressure exist, to at once freely incise the integuments down to the bone, dividing the periosteum, for, unless this membrane be divided, the section of the integuments is of but little use, as the following case, somewhat abridged, will show :—

"A. B., *ætat.* 22, moderate stature, dark eyes, hair and complexion, with a slight tendency to scrofula in his constitution and in his family, but who has always enjoyed good health until the present illness, *except* a tendency to colds. October 26th, 1840. During the last week has had an irritable spasmodic cough, accompanied and probably caused by subacute inflammation of the tonsils and of the neighbouring mucous membrane. The glands are of an enormous size, and not unfrequently the seat of inflammation on taking cold, which is the case at present from sleeping in a thorough draught for several nights. He had had also a slight ear-ache two or three times during this attack, but did not pay any attention to it. On the morning of the 26th he arose with a severe head-ache, for which he was ordered a dose of calomel, which purged him freely, but did not remove the pain in the head, which, in spite of other aperients, continued all over the head, but was worse on the right side. In a day or two it was confined chiefly to the

right ear, and increased in severity in spite of fomentations, bran poultices, &c., until on the 30th, at 8 P.M., after most intense suffering, the membrana tympani gave way, and rather less than a tea-spoonful of matter rushed out with a gurgling noise, with instant relief. This state continued for several days, the discharge being comparatively trifling, and he was gaining strength until the 14th November, when the tonsils became reïnflamed, and he had a severe attack of ear-ache. On the 17th the right tonsil was lanced, with great abatement of the pain, although but little matter was discharged, and he again began to recover strength, having a generous diet and tonics, but on the 29th he had a relapse, and suffered acutely from intermittent ear-ache, which, with fever, restlessness, sleepless nights, and violent perspirations, soon brought him low enough. The pain, when it came on, was generally relieved by a glass of hot mulled port wine, and was considered to be nervous, not inflammatory. Quinine, &c., was also ordered.

"About a fortnight afterwards, as the pain was often severe in the mastoid region, that part was freely leeches, and a cupping-glass applied over the bites. Syncope ensued after the abstraction of four ounces of blood, but the pain was not alleviated. On the 24th a swelling was discovered behind the ear, which was opened on the 26th, and rather less than a dessert-spoonful of matter escaped. The opening was enlarged two days afterwards, and the abscess discharged freely, nevertheless the matter continued to burrow backwards, and all the superficial glands of the neck soon became enlarged, especially those in the course of the blood-vessels, and along the angle of the jaw. An opening was consequently made about an inch and a half beneath the right angle of the jaw, the result being that the matter gradually drained away, and, as he had a good appetite, was allowed to indulge it, and took tonics, he slowly regained his strength, and the enlargement of the glands subsided. By the 22nd of January, 1841, he began to get about, the opening in the neck was allowed to close, but that over the mastoid process continued to discharge more or less

throughout February and March. It was supposed to communicate with the mastoid cells, but no carious bone could be detected by the probe, which could be readily passed in an inch or more backwards. It was not deemed advisable to lay the sinus open, and no exfoliation took place, nor did the discharge return. The hearing throughout was but little affected.

"April 5th. Change of air being thought advisable, he went to Brighton, but was unable to bear the strong winds always prevalent there in the spring, and consequently had a most severe attack of influenza, during which the discharge from the ear was at times very profuse. After residing a short time in an inland valley, where he picked up a little strength, he returned to town, and on the 23rd went into Wiltshire, at which time the discharge amounted to only two or three drops in the course of the day. Here, while taking horse exercise, he complained of a dull aching pain in the neighbourhood of the ear, and soon afterwards a small swelling was found above the old opening, in a line with the top of the ear. This increased in size, was hard, without tenderness or redness, and the pain dull. A day or two after it was incised, but no matter then flowed out, but shortly after, on enlarging the aperture, some offensive pus was discharged. Severe headache next ensued, and continued for some days, although the discharge was free. The pain came on suddenly, and attacked the upper jaw and face, but was most severe over the temporal and parietal bones. It was most intense in the afternoon and night, the patient being comparatively easy in the morning; a tumbler full of hot mulled port almost always gave relief. Quinine and a generous diet were also ordered. After this he continued gradually to improve. The lower opening closed first, the cicatrix being drawn in, and leaving a marked depression, the upper one not being healed till the 17th of July. July 23. Three cicatrices, a perforation in the membrana tympani, and a very slight imperfection in the sense of hearing, are now the only remains of the disease."

This case, so interesting and instructive, would lead to the belief that the incisions were made solely for the discharge of the matter, and that the periosteum was never really liberated. Hence the repeated relapses.

The immense importance of recognising the true character of this disease will be shown by the following cases:—

Mr. —, aged 70, a gentleman residing in the north of London, of full habit of body, and very luxurious and free in his mode of living, who had suffered for some years from a discharge from the left ear, after taking a walk in his garden during an evening in July, the weather being warm, but very damp, was seized with severe pain in that ear, which rapidly extended to the scalp and muscles of the head, rendering the integuments painful to the touch. Leeches were freely applied, and other antiphlogistic remedies were had recourse to, with the requisite attention to diet, &c., but without much relief. The pain in the ear gradually subsided on the occurrence of a plentiful discharge of thin mucus from the organ. The meatus, on examination, was found to be so much inflamed and swollen, that the condition of the membrana tympani could not be ascertained. The head symptoms were now the most prominent, especially those affecting the occiput and the mastoid process, and the unfortunate sufferer lay for weeks apparently without sleep, and indeed without passing a moment free from severe pain, amounting even to agony.

About two months after the commencement of this attack, the author first saw this gentleman. There was a free discharge of thin muco-purulent matter from the ear, which had continued for some time previously; the meatus was much swollen and inflamed, and the integuments covering the mastoid process were tumid, pointing, and tender on pressure, with a sense of fluctuation, leading to the belief that suppuration had taken place. The general symptoms of inflammation of the scalp still continued, and the patient's health was evidently greatly disordered. The symptoms of fever were well marked, and, as is usual in such cases, were much aggravated at night-time.

A free incision was made through the integuments covering the mastoid process, down to the bone through the periosteum; this gave immediate relief, which continued for some hours. The pain affecting the scalp, and the benumbed sensation, so frequently complained of in this and in similar cases, subsided altogether. The patient had a good night, with several hours' refreshing sleep. But the relief thus afforded was unfortunately only temporary; all the symptoms returned with redoubled violence the next day; the incision was consequently reopened, and leeches were freely applied,—calomel and opium were also given internally, in the usual doses, until the mouth became affected, the meatus externus being frequently cleansed with warm water.

For three weeks, during which this plan of treating the disease was steadily persisted in, the patient manifested great improvement. The progress of the case, indeed, was so very satisfactory, that a speedy and a certain convalescence was anticipated, when, from his own imprudence in inadvertently and needlessly exposing himself to cold, he had a relapse, attended with a return of all the symptoms previously existing, but in an aggravated form. The discharge from the ear reappeared; the pain in the head and scalp returned, and was exceedingly severe; head-symptoms followed, next paralysis of the face on the diseased side, and the patient gradually sank.

While this case was under treatment, a belief was entertained by some of the medical gentlemen who saw it with the author, that the head was primarily affected, and the ear subsequently. The *post-mortem* examination however, showed clearly that the principal mischief lay in the structures of the organ of hearing, and that, consequently, it must have been the primary seat of disease, the brain and its membranes being comparatively but slightly affected.

The diseased structures were most carefully examined. All the canals were found to be filled with purulent matter, *as were also* the cells of the mastoid process, the bone itself

being in a state of caries. The dura mater covering the petrous portion of the temporal bone was separated and detached from its connection with that bone; it was much inflamed and thickened at that part, and there was an extensive layer of effused lymph deposited on it; but there were not any evidences of even commencing ulceration. The brain itself, even in the immediate neighbourhood of such extensive disease, was comparatively healthy; and doubtless had the case been topically treated earlier, there would have been a greater chance of the patient's recovery.

A case of destruction of the mastoid process as a result of chronic internal otitis, is recorded in Kramer's work; it points to the benefit of attending early to that part, and the more so, as destruction of the ear may not only be prevented, but life saved.

"A soldier, named Hittberg, had suffered for many years from pain in his ear, discharge of pus, and great difficulty of hearing. Notwithstanding this, he was appointed to his regiment, but three weeks afterwards he had violent fever, and dreadful pain in the right ear. In the left the pain was supportable. A bleeding, emollient poultices to the right ear, a second bleeding, blisters, and enemata, in some measure diminished the pain, which however always returned, though the discharge was never interrupted. During the most violent pain, a blister had been applied to the mastoid process of the affected side, and thus a slight elevation had been induced over that spot, which indistinctly fluctuated. After repeated applications of emollient poultices, an incision an inch long was made through the swelling down to the bone: the bone was rough, worm-eaten, and presented an opening, from which however only a small quantity of pus escaped; but on introducing a syringe, and injecting some pectoral infusion, pus escaped through the ear into the mouth, accompanied by a very peculiar sensation. Great relief from the pain in the head followed immediately on this; the opening in the wound discharged a good deal of pus. The wound was dressed with dry lint, and the depuratory injections were repeated

daily; in eight days the discharge had ceased, and in three weeks the wound of the integument was healed. The patient never experienced pain in the head again, and his hearing, compared with what it had previously been, was even much better."

These cases of internal otitis will assume a variety of phases. Dr. Little relates a case in which the disease was mistaken for idiocy, until at length the membrana tympani burst, and discharged a quantity of pus.

Two singular cases of otitis have also been recorded by Dr. Griffin in the *Dublin Journal of Medical Sciences*, in which the attendant symptoms were those of tertian ague. "A young man who had previously enjoyed very good health, complained of pain in the left side of the head, attended by rigors. At first the paroxysms were rather irregular, but they very soon assumed the form of tertian ague, coming on every other day, at the same hour. The cold stage began about noon, lasting about half an hour; a feverish stage of somewhat longer duration then came on, and this was followed by a profuse sweat. During the intermissions the pain in the head was not complained of; there was neither thirst nor heat of skin, but constant wakefulness; the patient could not sleep. A tumour was now observed over the mastoid process on the left side; this was opened, and a very large quantity of brownish and extremely offensive pus burst out with very great force, giving considerable relief. The bone was carious over a space as big as a shilling. After the lapse of about ten days, the pain in the head and in the mastoid process became very severe; the patient had violent shivering fits many times during the day, great heat of skin, excessive thirst, vomiting, and delirium; his face was flushed and his pulse hard. He died within a few hours after the accession of these symptoms."

We observe, by no means rarely, when caries of the mastoid process has been the effect of an accidental inflammation, that, the constitution being good, it may be confined to this part, and not spread to the internal ear;

ut when it has arisen from constitutional predisposition, r has been excited in an unhealthy person, the whole ear soon becomes involved, and even the squamous and internal portions of the bone may participate. These cases are frequently seen when discharges from the ear have existed for any length of time.

Scarlatina is not the only malady which in its progress may induce an attack of otitis, with all its serious and even very dangerous consequences. M. Triquet, in a work entitled "*Recherches Pratiques pour servir à l'Histoire des Maladies de l'Oreille*," traces lesions of the internal organ of hearing to the effects of scarlatina, typhus, small-pox, and diphtheria. He details the particulars of ten cases, in which one or other of those maladies caused an attack of otitis, and the original disease, aided more or less by that superadded in the ear, having proved fatal, he gives at some length the *post-mortem* appearances he found in the auditive process on dissection. After remarking that those who have ascribed the ravages caused in the human frame by the diseases above-mentioned have rarely or but slightly commented on the secondary but most important affections of the ear; and after citing, as examples, Louis and Chomel, two of the most eminent physicians and authors in France, the latter of whom, when treating on typhoid fever, says of the accompanying deafness, which, he observes, is of frequent occurrence, "that it is not so serious a complication as might be supposed," M. Triquet proceeds to show the serious and extensive structural changes produced in the organ of hearing by either and all those diseases. They are evidently the results of violent and intense inflammation. It would occupy too much space to give in detail an account of the ten *post-mortem* examinations which he made, and of which he furnishes a full, and evidently a most accurate, report; but a brief notice of one or more of these cases will not be altogether out of place. He found, in one instance, an intense inflammation of the membrane lining the meatus, which was three times as thick as that of the healthy ear, and tinged with blood infiltrated into

its tissue. It was easily detached, and tore into stripes, without any effort, so that there was both infiltration and *ramollissement*. The bony parietes of the meatus were marked with reddish striæ, irremovable by either washing or maceration, showing plainly that the bone itself was inflamed. At the bottom of the meatus other changes were observable, especially a clot of blood as large as a small pin lying on the membrane of the tympanum, from which, however, it could be readily detached. The membrane of the tympanum was imperforate, but a violet reddish colour replaced its healthy transparency, and it was much thicker than usual. On separating it from its osseous attachments, the tympanum itself was found full of a brown, sanious, reddish pus, evidently mixed with blood. The ossicula and the chorda tympani presented an uniform reddish tint, and the membrane lining it also showed unequivocal signs of inflammation, and was bathed with a sanious pus, which was also found in large quantities in the mastoid cells. The mucous membrane lining those cells—a continuation of the membrane of the middle ear—offered the same characters—redness, vascularity, thickening, and in many parts was completely lost, the bony walls being denuded and exposed. In this case the labyrinth escaped, and the stapes still closed the fenestra ovalis, and seemed to bar the extension of the inflammation in that direction. The vestibule was quite sound, as were also the cochlea and the auditory nerve.

In another case, the otitis being caused by phthisis, the membrane of the tympanum was completely destroyed, the tympanum full of a yellow, thick, viscid, and foetid fluid, as were also the mastoid cells and the Eustachian tubes; the ossicula were lost, a few spiculæ being found in the pus, the petrous portion of the bone quite friable, the lining membrane of the cells destroyed, and the bone in a great measure necrosed; the membrane covering the foramina rotundum and ovale ulcerated through, like that of the tympanum, and the labyrinth, in fact all the internal ear, full of pus; on the left side the semicircular canals and

the cochlea were destroyed; on the right, the latter only remained, and was quite normal. On each side the auditory and facial nerves could be traced to the bottom of the external meatus, but not beyond it. The otic inflammations occurring in phthisical patients, M. Triquet does not regard as tubercular, although several writers on phthisis, who have cursorily alluded to it, so consider it. That which they have looked upon as indications of the presence of tubercle, he assumes to be merely concrete, solidified pus.

The dissections, however, which were conducted by him with so much care and accuracy, prove the occurrence of an otitis in the latter stages of many severe diseases, and the consequent sympathy of the organ of audition with the system at large when diseased, if we do not admit the dogmata of the humoral pathology, and refer the otic inflammation to the presence of a specific poison in the blood, as in rheumatism and gout, shortly to be noticed. The facts he has adduced clearly point to the necessity of attending to and closely watching the ear in all cases of typhoid fever, small-pox, phthisis, as well as in those of scarlatina, and of employing the requisite treatment early. The otitis thus set up, M. Triquet asserts, is of the *suppurative character*; consequently the presence of pus in the tympanum will cause distension of that cavity, and pressure on its membrane rendering it convex. Subsequently inflammation of the membrane—the natural result of the pressure—will lead to ulceration, and to all the sad consequences already indicated. To prevent this, he recommends the washing out the cavity of the tympanum by injections through the Eustachian tube, and then, if that object cannot be carried out, the operation the writer will describe in another part of this work as necessary under such circumstances must be had recourse to without delay; that is to say, puncturing the membrane of the tympanum has then become needful, so as to assist the evacuation of the retained pus, and prevent the occurrence of greater and more dangerous mischief. If the disease be allowed to advance,

the osseous parts may soon become diseased, and fatal hemorrhage be the consequence of neglect.*

How suggestive are the following observations made by Kramer:—

“Pain in the head, therefore, when associated with continued, though not equally severe, pain in the ears (which in children is denoted by their frequently putting their hands to their ears), should induce us to examine the ears, both externally and internally, with the most scrupulous care. In inflammation of the cellular tissue of the middle ear, the membrana tympani is likewise inflamed and very sensitive, as is also the meatus, on the least motion of the lower jaw, as in chewing, gaping, &c. The Eustachian tube, when an examination of it can be made, is found closed, and at its mouth very sensitive, even to the air-douche. Observant patients remark very distinctly that all their complaints originate in the ear, and extend thence to the head, and to the eye, &c.

“Especially important, however, is the sudden suppression of a previously existing discharge from the ear, which is only the more readily overlooked, the less importance the patient is disposed to attach to the suppression of a discharge to which he has for years been accustomed, and the less he is disposed to call the practitioner’s attention to the circumstance, in consequence of the state of morbid listlessness in which he is. The diagnosis, however, becomes most difficult in those cases in which the discharge from the ear is not suppressed, or where the painful sensations in the ear are soon stunned by the augmenting cephalic complaints, which turn all the attention, not only of the patient, but also of the practitioner, to the cerebral affection. But even in these circumstances, which render the diagnosis so extremely difficult, a sure guide is not unfrequently met with in the simultaneous affection of the mastoid process. This is observed to be of a livid red

* In a case of scarlatina under the care of Dr. Little, the ulceration and inflammation of the ear proceeded so far as to involve the lateral sinus, which gave way, and the patient sunk from the hemorrhage.

colour, and indeed is felt to fluctuate; on being laid open, either naturally or artificially, the bone is found to be carious, and by carefully giving to the probe the proper direction, it may be introduced into the cavity of the tympanum. If there be an opening in the membrana tympani large enough to admit the blunt end of the probe, this is then the most direct way of discovering the carious condition of the petrous portion of the temporal bone."

SCROFULOUS INFLAMMATION OF THE TYMPANUM.

A strumous habit of body modifies the characters of inflammation, whatever organ it attacks; and this modification also takes place even in specific diseases. Thus it happens, that, when scarlatina attacks a strumous subject, the chronic mischiefs liable to ensue are apt to be aggravated in character as well as protracted in duration; thus may be explained many of the unfortunate results of this disease described in the last section. But, apart from this, there is an inflammatory condition which has what may be called the specific characters of scrofula, its seat being chiefly in the glandular system, and its type being marked by want of power in the constitution, and intolerance of treatment by depletion.

In the ear this inflammation attacks, first, the mucous membrane, and, like the catarrhal inflammation before described, the glandular structure of the meatus; it rapidly progresses towards, and sooner or later involves, the middle ear. Now and then it wanders from one ear to the other, sometimes as a sequence of scrofulous ophthalmia, or of strumous disease in the nose and throat. When scrofulous ophthalmia, so remarkable for the intolerance of light, which is one of its principal symptoms, suddenly subsides, either under treatment or spontaneously, the ear is liable to be attacked by inflammation of a similar character by a sort of metastasis, and then the same exalted sensibility will be exemplified in an intolerance of noise. The slightest noise becomes painful in the extreme for days together. It unfortunately happens, however, that this condition seldom

excites alarm until deafness ensues and arouses attention, and then mischief has been done which too often terminates in total deafness, and, if the disease has shown itself in early childhood, even in mutism. The inflammation in these cases attacks the fibrous structure of the membrana tympani, which, ending in a thickening and deposit on that membrane, destroys its functions often for life. In some cases the inflammation is less acute, and the patient suddenly recovers by metastasis, the eye becoming again the seat of this peculiar form of ophthalmia. The following case will illustrate this point:—

Case.—A physician brought his child, a boy of ten years of age, to consult the author in 1853, and gave the following history of his illness. The child was of a weakly constitution and strumous habit; he had previously suffered for years from strumous ophthalmia, the disease obstinately resisting all the means used for relief, when it suddenly subsided, leaving scarcely a vestige of inflammatory appearance in that organ, the only indication of anything wrong having occurred being a degree of short-sightedness. A week afterwards, the disease suddenly attacked the ears on both sides. The hearing became painfully acute for days together, the slightest sound causing extreme distress. This was disregarded by the parents, as no signs of disease were visible; and it was not until total deafness in both ears set in, that the case excited any attention. When the author saw the boy shortly after this, there was but little inflammatory action to be seen on the membrane of the tympanum, and no obstruction in the Eustachian passage, but there was total deafness, so that a watch could not be heard even when applied close to the organ. The case had a most unpromising aspect, but knowing, from other instances which had come under his observation, that inflammation of this type was accustomed to attack different organs consecutively by metastasis, the author encouraged the parents to hope for some improvement. The remedies used were, small doses of mercury, with a view to the absorption of any probable deposit of lymph, and an ~~external~~ blister behind the ears, with change of air, and

sea-bathing, the child's health being out of order. This plan was pursued with modifications for six months, when the right eye became suddenly reïnflamed, and forthwith the hearing was restored in the right ear. In this state the child remained for some time, and at length the left ear improved considerably.

The variations in the appearance of the meatus and tympanic membrane, which are observable in this disease, are not so much to be relied upon as the improvement of the general health, and the extension of the hearing distance. These cases, although unpromising, should not be abandoned, but persevering treatment, combining the advantages of both artificial and natural medication (hygiene) should be adopted.

Inflammatory affections of the ear in scrofulous subjects, whether brought into action by scarlatina or by any other cause, are apt to end in permanent mischief to the osseous structures, attended with chronic otorrhœa of an offensive character and persistent, not unfrequently accompanied with ozena, swollen nostrils, strumous ophthalmia, and enlarged tonsils. These complications are so common, especially in children, that they merit special notice, and may be classed under the general name of

Strumous otorrhœa, although as has been already remarked, otorrhœa is a symptom of disease, and not a disease *per se*. Discharges from the meatus in scrofulous subjects very generally proceed from some disorganised condition of the structure of the tympanum, or even of the internal ear, of which more may be learned from the history of the case, than from the symptoms which present themselves.

The prognosis in these cases should therefore be guarded, but still if the disease have not proceeded to the absolute destruction of the machinery essential to audition, there are few cases more completely amenable to constitutional treatment and derivative measures. Let it be borne in mind however, that in any stage of the disease, the inflammation may suddenly extend to the meninges of the brain, and present the symptoms so well known under the

name of tubercular meningitis, which, without extreme care, and sometimes in spite of any treatment, will prove fatal.

The progress of these cases is, upon the whole, sufficiently uniform to admit of a general sketch, which may be found practically useful.

This insidious and highly dangerous affection generally begins with pain in the ear, and for some time may be considered merely as a common ear-ache. Sooner or later, however, the inflammatory symptoms extend inwards, and are then speedily complicated by signs of cerebral irritation. Sometimes a discharge of matter takes place from the ear, which is expected to relieve the brain; but the pain continues or becomes more violent. The patient is oppressed and drowsy, then slightly delirious, often with shiverings, and is at last comatose. In other cases there is no discharge of matter, but the patient, after complaining for a day or two of deep-seated pain in the ear, becomes restless and forgetful, lies rolling his head from side to side, or tossing about his arms, and in a short time sinks into coma. In other cases again, the affection supervenes upon the sudden cessation of a purulent discharge from the ear, which perhaps may have been of some standing; such as that which often follows scarlatina. The sudden disappearance of the discharge in these cases is followed by pain in the ear, by languor and drowsiness, and in a few days by coma.

The pulse is in some cases frequent, in others normal, and in others again below the natural standard. The nature of this disease is illustrated by dissection. There is generally caries of the pars petrosa of the temporal bone, sometimes confined to a small part of that bone. A portion of the dura mater corresponding to this part, is inflamed and thickened, spongy, or ulcerated, and generally detached from the bone. Betwixt it and the arachnoid, there is commonly a deposition either of purulent matter, or of false membrane, this deposition sometimes extending along the tentorium. In some cases there is a superficial abscess

of the brain itself, or of the cerebellum, often with effusion into the ventricles, and the other usual marks of general disease in the brain. Matter is also frequently found on the petrous portion of the temporal, in the semicircular canals, and in the cavity of the tympanum, and sometimes it extends into the cells of the mastoid process, and is occasionally found in the brain itself, constituting a true abscess. The mastoid process may be wasted away by the continued discharge, or by absorption, as also may be the contents of the labyrinth.

The *diagnosis* may be formed from the examination of the diseased structure with the probe; this, on being introduced through the fistulous opening, is felt to strike against the carious surface of the bony portion of the meatus; the membranous portion of the canal and the membrana tympani being otherwise apparently sound, unless they happen to suffer accidentally from some other independent disease. The progress of this inflammation of the periosteum is generally very chronic. In the course of the disease, larger or smaller portions of these decayed osseous parts are thrown off, and making their appearance at the fistulous opening communicating with the meatus, are either carried away along with the pus, or may be easily removed with the aid of the forceps.

Treatment.—In the treatment of this form and stage of strumous otorrhoea, there are three prominent indications to be observed. 1. The state of the constitution must be improved by such remedial treatment as the general symptoms may require. Tonics, nourishing diet, cod-liver oil, exercise in the open air, and, above all, sea-bathing and frictions on the surface, are among the most obvious remedies. But in these cases, the care and skill of the experienced practitioner of medicine are often taxed to the utmost, while the local nostrums of the quack, on which too much reliance is unfortunately too often placed, are liable to be attended with a fatal result. 2. The discharge must be carefully and diligently washed away by injecting tepid water into the meatus twice or thrice daily. 3. The danger, always

impending, of the extension or translation of the disease to the meninges of the brain must be guarded against by derivative treatment. A seton should be applied to the nape of the neck, or an issue opened in the arm, and kept patent during the period of danger, and for some time afterwards. The author is inclined to the opinion that when mischief arises from checking these old and long-continued discharges from the ear, it is caused by the wrong direction of our curative means ; in fact, the too hasty drying up of the discharge, prior to the establishing a drain at some distance, either by issue or seton, as the case may require, is often attended by dangerous results.

If the above indications of treatment be carefully and systematically followed out, the degree of improvement and the extent to which the hearing will probably be restored, will be often greater than, from the destruction of parts, could have been anticipated. The sinuses in the meatus will be filled up, the aperture in the membrana tympani will be closed, and the patient will sometimes recover a considerable amount of hearing.

SYPHILITIC DEAFNESS

Generally attacks the tympanum in the form of inflammation of its mucous lining, to which it has extended through the medium of the Eustachian passage, communicating the disease from the throat. It is very frequently mistaken for nervous deafness. The history alone will direct to a true diagnosis ; consequently, the real cause is not always apparent, and the disease being uncontrolled, terminates in the closure of the Eustachian passage, and in an amount of derangement, both of the contents of the tympanum, and in the nervous structure of the internal ear, unascertainable during life. The throat, fauces, and mouth should therefore be carefully examined for syphilitic ulcers, or for the deep scar left by a former ulcer. The patient also must be looked to to supply the chief evidence. Nervous deafness is always a suspicious circumstance, espe-

cially when regarded in connection with primary or secondary symptoms, or other illustrative antecedents. The physical appearances are dryness of the meatus, opacity and thickening of the membrane of the tympanum, and generally, a granular state of the mucous follicles of the throat, with intense headache. The constitutional signs are, syphilitic ulcers in the throat, fauces, or tongue, copper-coloured eruptions, inflammation of the iris (syphilitic), alopecia, nodes on the long bones, and, in short, any or all of the symptoms indicative of secondary or tertiary syphilis. Of the local signs, the fulness in the head and intensity of headache are well marked, especially towards morning. These symptoms are among the first to yield to the influence of alterative doses of mercury.

Treatment. The diagnosis being made satisfactorily, mercury is the great remedy, and it should be so administered as not to disturb the general health. The author has found that the method recommended by Mr. Langston Parker, that of fumigating the throat night and morning with the binocide of mercury, is a most eligible mode of treating these cases; but its effects should be closely watched. It must be recollected, however, that this disease closes the Eustachian passage early, consequently the effects of the mercurial fumigation are constitutional rather than local. This is one of the few cases wherein the surgeon may expect some benefit from puncturing the membrana tympani, as a *dernier ressort*, if the tube remain closed after the disease has been cured; an operation however far too frequently performed, even in cases by no means physically adapted to such a remedy.

Case.—A porter, *ætat.* 58, had suffered from primary and secondary syphilis for some years, and at length became deaf, first on one side for several months, then on the other, so that at last he could not hear a word spoken, unless it were loudly shouted into his ear. He consulted the author in the year 1848. At that time, he complained of sore throat. There was no ulcer, but the tonsils were enlarged and indurated, and the mucous membrane in a thickened

state. He had taken mercury repeatedly, with more or less benefit for the time being. Mercurial fumigation was prescribed, and continued for three months, with a view of promoting absorption of any deposit which might have caused the obstruction of the Eustachian tubes, both which were found to be impervious, as evidenced by the otoscope and the catheter. But no benefit accrued to the hearing, although the condition of the throat and tonsils was much improved by the use of the mineral. The membrana tympani on each side was consequently punctured by the needle-shaped trocar delineated p. 171. On the left side no benefit resulted; on the right, the hearing was immediately restored, but as the aperture diminished in size, the deafness returned. The operation was repeated again and again with a similar result, and, at length, the patient having been instructed to pass a probe frequently through the incision, a permanent aperture was established; still the hearing gradually diminished. At present, however, he can at any time improve his hearing for the occasion by passing the probe, which appears to the author, after much experience in these cases, to be the most eligible way of checking the healing process that so readily goes on after artificial perforation.* It is possible in this case that a more energetic course of mercury of short duration, in the manner recommended by Mr. Hunt for syphilitic eruptions, might succeed in promoting a further improvement; and probably Mr. Saunders is right in the opinion he expresses that, as the opacity in syphilitic ophthalmia often yields to active mercurial treatment, so, in many cases of "nervous deafness," probably, an inflammatory deposit has taken place, not on the nervous structure, but adjacent to it, which, whether it be, or be not, syphilitic, might be expected to yield to mercurial treatment. The author's experience certainly confirms this observation, and proves that the proximate cause of syphilitic and nervous

* The treatment of deafness by puncturing the membrana tympani will be found more amply discussed in the section on the obstruction of the Eustachian tube.

deafness is often the same, and will yield to analogous treatment. The mild alterative mercurial plan with fumigations to the throat has been found successful, even after two or three years of persevering treatment. In these cases, the bichloride, combined with cinchona or guaiacum, administered in intermittent courses, has been found useful, the inhalation of iodine and guaiacum being meanwhile had recourse to—medicines which certainly exert a beneficial influence on the throat, and often relieve the distressing noises attendant on nervous deafness. In those rarer cases where mercury fails to effect its desired results, the iodide of potassium in three-grain doses will be found to be very serviceable. It is a remedy of great value in all cases of secondary and tertiary syphilis affecting the ear.

RHEUMATIC AND GOUTY INFLAMMATION OF THE TYMPANUM.

Inflammatory affections of the structures of the ear present the same local symptoms, whatever be the cause or specific character of the inflammation; but it is highly important for practical purposes to detect any special type which may exist in a given case, because, although the symptoms may be very similar, the treatment required may be, and often is, extremely diverse. This is emphatically true in regard to rheumatic and gouty inflammations, both constituting, sometimes in their acute, and more frequently in their chronic forms, a very common cause of deafness in this country.

The *diagnosis* of rheumatic and gouty inflammations of the ear, whether acute or chronic, is not more difficult than when the joints are affected.

Rheumatic inflammation of the ear affects chiefly the fibrous structures of the tympanum; but as other parts of the organ are also often attacked, it will be convenient here to review the whole subject. The disease may attack any portion of the fibrous structure of that organ: accordingly, the cartilage of the auricle, the periosteum, the membrana tympani, and the neurilemma of the nerves distributed to

the cavity of the tympanum, and to the canals in the petrous bone, are frequently affected. The disease may seize any of these structures either in its acute or chronic form.

Acute rheumatic inflammation of the fibrous structures of the tympanum exhibits precisely the local symptoms which have been described as diagnostic of acute myringitis; but the general history of the patient's health is the source to which we must look for determining the specific nature of the inflammatory action. In rheumatic affections the patient will always have been suffering for a longer or a shorter time from this peculiar malady affecting the larger joints, whether or not it be the first time he labours under that disease. He then begins to suffer from some undefined, unaccustomed sensations about one side of the head; the scalp generally is tender, and exceedingly painful on pressure, and that even sometimes on the slightest touch. The temple on the side affected, all the parts about the ear, the mastoid process, and even the vicinal portion of the cheek, as well as the jaws and teeth, are the seat of a morbid sensation, with considerable pain, and the patient complains also of a deep heavy tinnitus of a most distressing character. On making an examination of the ear, the lining membrane of the meatus, and the membrane of the tympanum, are found to be swollen and inflamed, and the latter has lost its transparency. Of course the sense of hearing is more or less impaired. The throat on the same side partakes in the disease; the parts around are swollen, and of a lurid red colour, the inflammation extending up the Eustachian tube. The tonsil on the same side is engaged in the inflammation, causing, with the diseased condition of the other parts of the throat, considerable pain and difficulty in swallowing. This state of the parts involved in the rheumatic attack is, as a matter of course, attended with all the symptoms of febrile excitement, presenting, however, generally the characters of an intermittent fever. Exacerbation of all the *symptoms* takes place towards night, as usually occurs in

disease of a rheumatic origin. The neighbouring organ, the eye, is sometimes inflamed before the ear is attacked, sometimes consentaneously with it, and sometimes not until after the inflammation of the organ of hearing has made some progress.

The rapidity with which an acute attack of rheumatic inflammation often destroys the organ of hearing from periosteal inflammation and caries, has repeatedly astonished the author; it shows clearly the necessity of vigilance on the part of the surgeon, as, by early and judicious treatment, much mischief may be prevented, and consequently also the disorganisation of the internal apparatus of the organ.

Case.—Mr. G., a strong, stout man, æt. 50, consulted the writer in the autumn of 1847, suffering from a severe pain in his left ear, with a benumbed sensation extending over the temporal and mastoid regions, and considerable tenderness on touching the scalp or combing the hair over that part of the head. He also complained of a heavy; deep tinnitus in the organ of hearing. He stated that about a month previously he had had an attack of articular rheumatism, principally affecting both the knees, but occasionally invading the wrists and elbows. For this he was treated in the ordinary manner by his medical attendant. He was bled, leeches, purged, and probably had colchicum, &c. This illness confined him to the house for more than six weeks, during which time he had several paroxysmal attacks in the ear. After that time the rheumatic affection of the joints gradually subsided; and when he consulted the author, he complained principally of a shooting, throbbing pain in the ear, extending down the cheek-bone, with tenderness and numbness over the mastoid process. On examination of the meatus, it was found in a swollen and inflamed state, so that the condition of the membrane of the tympanum could not be ascertained. The inflammation of the meatus was accounted for by his having had several hot and stimulating applications, used both internally and externally to the ear during the paroxysmal

attacks, on the supposition that they partook of the nature of *tic-douloureux*. The mucous membrane of the throat was involved in the disease, and the tonsil on the left side was inflamed and considerably swollen, causing some difficulty in deglutition. He was forthwith recommended to lose blood by cupping, and by the application of leeches over the mastoid process, and his system was brought under the influence of mercury, which was exhibited, combined with colchicum. This treatment was pursued for ten days, when the meatus of the ear was again examined, with a view to ascertain the condition of the *membrana tympani*. This was now found possible in consequence of the inflammation and swelling having yielded to the antiphlogistic treatment. The membrane of the tympanum had lost its transparency, was of a brownish-red colour, and was bulging forward, appearing as if the cavity of the tympanum behind it were distended with pus. The pain he had previously suffered was soon diminished in severity, a small abscess having burst in the throat, but the tinnitus continued unabated. During this time he complained occasionally of flying pains in the joints. The ear was examined from time to time, and as the pain and tenderness over the mastoid process continued, the part was carefully examined, but without detecting any sensation of fluctuation. As however the symptoms had continued so long, an incision was made over the mastoid process down to the bone, with a view to free the tense and inflamed periosteum. Mr. G. experienced considerable relief from this, and, with the aid of an opiate, he slept better that night than he had done for two months previously. The wound was kept discharging, the pain in the ear gradually subsided, and the tenderness was removed. Colchicum was then administered combined with quinine, and the patient finally got well, although the tinnitus continued, with some diminution of the hearing, for upwards of a twelvemonth afterwards.

This case is interesting as affording an illustration of the relief given to the patient, after the integuments over the

mastoid process had been freely laid open, and the periosteum divided, although suppuration had not taken place. There cannot be any doubt but that the cure was expedited by such a mode of proceeding, nor any respecting the effect colchicum has over tinnitus, even when of long duration, if arising from a rheumatic origin.

As this case remained under treatment upwards of twelve months, it afforded the author an opportunity of examining the changes in the membrane of the tympanum from time to time; he was much astonished at the rapidity with which the morbid deposit disappeared after the restoration of the ceruminous secretion, a circumstance which always presents an unerring indication of improvement within. Another instructive suggestion is afforded by this case. No doubt the abscess in the throat was produced by suppuration in the tympanum; the pus finding no means of exit into the meatus, drained away into the throat. The light which more recent experience has thrown upon this case would have induced the author to have perforated the membrane when it presented the bulging appearance above described. The relief obtained by the patient in this case may be considered as a rare exception to the general rule, *that when a tympanic abscess is allowed to take its own course, sloughing and destruction of the membrane, and probably necrosis of the ossicula, will be the result*, and no other remedy remains for the consequent deafness, but that doubtful, and at best imperfect substitute, an artificial tympanum.

After the active stage of rheumatic inflammation has subsided, it is too often found that an obstinate otorrhoea remains, which, if neglected, may lead to an exfoliation of some portion of the osseous structure. This discharge, therefore, a serious evil in itself, especially if it be foetid, is likely to lead to still greater mischief, unless arrested by timely interference. Astringent injections are necessary, and none can be better than one composed of the dilute acetic acid and iodine, in the proportion of a drachm and a half of dilute acetic acid, half a drachm of tincture of iodine,

and half a pint of distilled water. An occasional blister behind the ear will be useful by way of counter-irritation, and the internal treatment should be regulated by the state of the health, not overlooking the rheumatic diathesis. In this, as in all other cases of otorrhœa, it should be held as a maxim, that the patient is never safe until the discharge has been completely arrested.

Chronic Rheumatism of the structures connected with the ear, is manifested by physical symptoms very analogous to those of chronic myringitis, and in its history and progress shows the presence of rheumatic pains in various parts of the body. The patient generally complains more of a sense of fulness and distension in the ear, as though some foreign body were within it, than of acute pain; and also of increased or exalted hearing, sound not inconveniencing the patient, as is the case with ordinary inflammation of the organ.

Diseases of the ear, when they arise from atmospheric or miasmatic impressions, as is frequently the case, combined with disorder of the general health, are not to be cured by external and local applications, but principally, if not exclusively, by those means which are calculated to remove diseased action, to restore the strength, and to re-form the character of the constitution. Trifling with and irritating the organ, with drops, unguents, and lotions, is only betraying the patient into a flattering and useless anticipation of benefit, without any chance of eradicating, or even of reaching, the root of the disease.

In the treatment of this malady our object ought to be, not merely to remove it, but to do so at as little expense as possible to the stamina of the body. Colchicum, in small, well-regulated, and duly repeated doses, is to be prescribed and used both externally and internally, combined with such other remedies as the peculiarities of the case may indicate. It is also necessary to adopt that regimen and method of life, and occasionally the use of those pharmaceutical remedies, which are calculated to preserve or re-

re the general health; and by a slow and almost imperceptible influence, as it were, to give additional vigour to the constitution.

It is of course impossible to give particular directions in every case which may occur, but a relation of two or three may serve to show the different modes in which the rheumatic diathesis steps in, as it were, modifying the character of the inflammation, and may indicate the treatment required.

Mrs. M., residing in the low parts of Essex, consulted the author last winter for a distressing noise in her ear, accompanied with diminution of hearing, and a benumbed feeling over the side of her head. She stated that nothing was the matter with her health generally—her ear only was the seat of mischief, for which she had used many drugs, recommended and advertised. Her history was, that, two years prior to the seizure in question, she had had an attack of rheumatism in her joints, attended with headache and neuralgic pains along the temple and jaws. This she apparently recovered from, but six months after, the noise in her ears had become most distressing, especially in the evening. It was difficult to convince this lady that the symptoms in her head were connected with the cause of the noise in the ears; that by proper and well-directed constitutional treatment she would recover from both maladies, she avoided the use of all locally applied nostrums.

The ear externally presented the usual appearance of chronic inflammation, the meatus was red and nearly distended with cerumen, the membrane was opaque, and the hearing distance less than two inches. The Eustachian tube was obstructed. The constitutional treatment consisted of the administration of half a grain of extract of chicory with some extract of gentian and compound sassafras pill, as a dinner pill daily; and twenty minims of tincture of guaiacum in a draught at bedtime. She was directed to gargle the throat with port wine, and counter-irritation was applied behind the ear. After a month's trial of these remedies, the patient was improved.

very much in health, and the noises were much diminished, sometimes ceasing for two or three days together. The hearing distance was not much augmented, and as the Eustachian passage was still partially obstructed, it was found expedient to use gentle dilating power with the catheter. The result was that the hearing was considerably improved, the noises ceased, and her general health was re-established. This was one of the many cases in which much time had been lost by local tampering with the meatus.

Miss B., residing in the north of London, was seized with rheumatism of the arms and considerable pain in the muscles of the neck; the seizure was attributed to sitting at the window during an evening in the autumn; her face, the following morning, was observed to be distorted, and she complained also of considerable pain in the ear. She was subjected to a severe form of treatment, the paralysis being supposed to indicate disease of the brain. This lady's recovery was retarded, and the paralysis all but made permanent by the severity of the treatment, although the history of the case shows the seizure to have had a rheumatic origin only, and that most probably superficial. The character of the pain and the subsequent discharge from the ear, the muscular portion of the neck participating generally in the seizure, strongly point, in these cases, to a rheumatic origin, and show that much of the severity of the treatment might have been spared.

Rheumatic deafness is often complicated with periosteal swellings under the scalp, noises in the ears, and sometimes dryness and a granular condition of the meatus and opacity of the tympanum. These cases are marked by headache, having its regular nightly paroxysms, morning perspirations, and gradual emaciation. The patients have mostly been treated for dyspepsia, rheumatism, gout, neuralgia, brow-ague, and often for phthisis. The peculiar expression of the countenance, and the pain and wakefulness during the first part of the night, reveal the true nature of the disorder. A blister to the head, opium at night, and

iodide of potassium and sarsaparilla during the day, have dissipated all the symptoms, and the patients have returned to their usual occupations. After this, some have had no recurrence of the attack; others are subject to relapses after various intervals, but are always relieved by the same remedies; others are attacked by periostitis in its more generally recognised form; while others, again, are relieved only so long as they continue to take the iodide of potassium. This medicine is best given in doses of three to five grains three times a day in guaiacum mixture.

Gout affecting the Structures of the Ear is a common cause of deafness, in both its acute and chronic forms. But as it is seldom that gout attacks the ear until it has repeatedly invaded the smaller joints, and thus unequivocally manifested signs of a gouty constitution; so when deafness attacks a gouty subject, it is natural to infer that the aural affection partakes of the specific character. It is also to be noted, that in this case severe headaches generally precede the occurrence of deafness.

Arthritic headache is a disease that often escapes detection, especially if the patient have not previously had a paroxysm of gout in its regular form, so as to aid the judgment of the practitioner in forming a diagnosis. The symptoms which mark the disease are attributed to an ordinary determination of blood to the head, or rather to the brain, and the treatment pursued is in accordance with such views. A greater mistake could hardly be committed, for depletory measures in the treatment of gouty affections of the brain and its membranes are generally injurious, yet they constitute the principal remedies employed to relieve the consequences of determination of blood to the brain, sometimes even when it is recognised to be of gouty origin, or connected with the arthritic diathesis.

Dr. Gairdner, in his work on Gout, observes, that metastasis to the head appears to be by far the most usual form of misplaced gout. "It occurs," he says, "with every degree of suffering. The headaches from which those persons suffer in whom the excretion of the urates and of urea

has, from any cause, been suddenly diminished, or temporarily arrested, are only the commencement of this affection, which may well be likened to the effect of a poison upon the system,—as indeed it really is,—a true intoxication. I believe that the substance of the brain itself is the part usually affected in these cases, and my reasons are, that the disease is never attended with delirium or wandering, but always accompanied by stupor and apoplexy; the ruptured vessel is found in the cerebral substance."

Arthritic headache then is a disease to detect which demands considerable discrimination and close observation, based on extensive experience, as it is only by distinctive signs, which by some may be regarded as apparently trivial, that we shall be enabled to determine the true nature of the attack.

It occurs generally among those in whom gout fails to show itself in the ordinary way, but remains lurking in the system, ready to pounce upon any organ, which, by fortuitous circumstances, may be liable to take on diseased action. The higher classes of the community, among whom gout is frequently a heir-loom of disease, being in many instances hereditary in both parents, are far more liable to this form of metastatic gout than are either the members of the middle or of the lower orders of society. It is likewise found to affect the females of a gouty family more readily than the males, and more frequently after a certain period of life, termed the "turn of life," has been reached. The younger members and the male branches do not meet with absolute immunity from arthritic headaches, but they are much less subject to its attacks.

The symptoms which are most pathognomonic of this disease are, a sense of fulness in the head, generally constant, but liable occasionally, from casual circumstances to change into severe pain; a feeling of vertigo or giddiness,—a feeling to which the attention of the patient is continually drawn, and which apparently impairs the powers of thought, and of memory: all the perceptions are confused, and the patient at the same time experiences a sensation as

he were about to become insensible; if he stoop, he is to be seized with temporary blindness; the hearing is inordinately acute, the least noise rendering him most distracted: he is frequently troubled with a buzzing sound, and sometimes with other noises in the ears; flushes and heat sometimes pass over the head and face; the ear is often tender and painful when touched, and the scalp feels hot, constricted, painful, and uneasy.

Case.—John B——, forty-three years of age, a butler in a nobleman's family, was admitted a patient at the Dispensary in the spring of 1851. He stated that he had been suffering from severe headache, more particularly at the vertex and back part, and a fulness in the ears, causing at times imperfect hearing, and vertigo. His medical attending physician, thinking it to be a threatening of apoplexy, advised bleeding and other evacuations; he was accordingly bled *ad quæritum*, but the relief being only temporary, and the symptoms afterwards becoming more severe, the operation was repeated, with the effect notwithstanding of relieving him for a day or two only; the symptoms then becoming worse, he was soon afterwards obliged to keep his bed. After some days he had a severe pain in the foot, evidently of a gouty nature, the headache and giddiness being in consequence considerably relieved. He was shortly afterwards seized with an intense pain in the lobe of the left ear, accompanied with swelling and redness; this continued to enlarge, and remained swollen for upwards of a month, when it suddenly subsided; the head symptoms, in the meantime, were much relieved, and he returned to his duties. Two months after, another attack, resembling the first, caused the same treatment to be repeated, with a similar result.

The author saw this man shortly afterwards; he was complaining of a heaviness in the left side of the head, a continuous and distressing noise, aggravated towards evening, and an occasional pain, resembling tic, on the side of the head and behind the ear. On inspection the structures presented nothing very remarkable beyond a dryness of the

meatus, and a slight duskiness of the membrane of the tympanum ; the hearing distance being only two inches on the diseased side.

The treatment pursued was the administration of half a grain of the extract of colchicum, twice a-day, a vapour bath three times a week, regulated diet, without stimulants, and less animal food than he had been accustomed to. The case progressed with but little relief for ten days, excepting only that he became more tranquil as to his feelings of nervousness, and had a copious general perspiration all over the body. He continued the colchicum for six weeks, the result being a gradual diminution of the tinnitus, and a considerable increase of the hearing distance.

It would be useless to continue the narration of this case further ; suffice it to say, that the patient perfectly recovered after a lapse of six months, being relieved not only of all the head symptoms, and of the hardness of hearing, but also of a troublesome scaly eruption with which he had been tormented for some years. The aggravation of the symptoms after blood-letting shows clearly the injurious effects of depletion, and evidently and forcibly indicates the caution necessary in all such cases when any large quantity of blood is drawn or about to be drawn from the system.

Case.—Mr. C——, a corpulent, elderly gentleman, consulted the writer for a troublesome and heavy beating in his head and ears, always aggravated after meals ; he suffers from pains in the knees and ankles, and from some difficulty in swallowing, arising from a thickening of the mucous membrane of the pharynx, and some enlargement of the tonsils. When he indulges his appetite somewhat freely, the throat appears, as it were, stuffed with a thickened mucus, and the hearing generally becomes imperfect, the meatus on each side being apparently choked up with a deposit resembling gypsum, which although removed by injections, repeatedly re-formed, accompanied with a discharge, the passage being reddened and the membrane of the tympanum slightly opaque.

This gentleman was advised to pursue a course of treat-

similar to that employed in the preceding case, with the addition that he commenced by taking active cathartics for several days. The treatment was continued for a period of nine days, with marked relief both to the chalky formation in the ears, and the threatened suffocation which he had for some time been suffering from. These cases not unfrequently arise from the mucous membrane of the throat in a thickened condition, causing a temporary obstruction of the Eustachian tubes. Although freely relieved by catheterism, the tubes do not long remain patent, and the case seldom does without the adoption of the constitutional treatment alluded to.

It is not uncommon to find, in many cases of arthritic headache, that the patients have an obstinate discharge from the ear on one or both sides, more frequently on one side than the other. This has been examined from time to time, and if allowed to dry on paper, presents some of the earthy consistence indicative of gout; * in such cases colchicum has been found extremely beneficial.

In these, as well as other affections of the ear of a gouty character, colchicum is the great remedy; but it requires judicious management. It produces an effect on the system in addition to its action on the bowels and kidneys, and ensures its specific operation in these cases, and deserves especial notice, as its peculiar action involves the consideration of certain pathological questions, which have not yet been satisfactorily elucidated; *i.e.* the influence of colchicum in augmenting the quantity of uric acid eliminated from the system by the kidneys, and discharged in the urine. The presence of this acid, or of its base, urea, in the blood of gouty people may now be said to be placed beyond the possibility of a doubt. It is the result of a disordered condition in the function of sanguification, or of the immediate preparatory process of chylification.

"know," says Otto, in his Pathological Essay, "a person in whom, during an atonic attack of gout, the whole mouth, throat, and gullet, are covered with a whitish mucus, which, when dried on blotting paper, yields a large quantity of phosphate of lime."

tion, greatly assisted by a failure on the part of the kidneys to perform rightly their secerning duties, by which the separation of urea and uric acid from the blood should be effected. The presence of this acid, or of its base, in the circulating medium, then, may be regarded as characteristic of gout, and the fact ascertained by Chelius, the professor of general surgery at Heidelberg, that the kidneys under the administration of colchicum, in the course of twelve days, are excited to abstract from the blood nearly double the quantity of uric acid they had previously separated, will amply serve to explain the remedial influence of colchicum in the relief of the disease, and the manner in which that influence was exerted.

The following rules for its administration will be found useful.

Colchicum should not be given in the asthenic form of gout.

It should never be given at the onset of a paroxysm, nor until the bowels have been duly acted upon by mild purgatives.

The first doses of the medicine should be very small ; they may be gradually increased.

Colchicum should be always administered at first, uncombined with any other medicine, until the practitioner has satisfied himself that it is not likely to disagree with his patient ; indeed there is always a disadvantage in administering this medicine in combination with others, since it may become difficult, if not impossible, at times, to determine what effect should be ascribed to the colchicum, and what to the other ingredients.

It should not be administered so as to excite nausea, vomiting, or purging. These effects should be regarded as indicative of the unfavourable operation of the medicine.

Colchicum may be regarded as acting favourably when, under its use, the urine is increased in quantity, a more abundant bile is discharged, the fæces, though solid, are surrounded by mucus, and the skin secretes freely.

The effects of colchicum should be carefully watched, like digitalis and other medicines, it is apt to accumulate in the system.

The use of this medicine seems chiefly applicable to the hemic form of gout, which occurs in robust constitutions, and in the prime of life ; it is almost inadmissible in persons advanced in years, who have had several attacks, and in whom the malady would seem too deeply rooted to be influenced by the temporary administration of this remedy.

These aphorisms may not only be taken to be true in the limited extent to which Chelius has applied them, but the author has found the medicine, with judicious management, equally useful and necessary, even in old age, with this reservation, that the doses should be so regulated as not to depress the system in any sensible degree.

ARTHRITIC OTITIS.

Arthritic inflammation of the ear* attacks chiefly the fibrous and mucous structures of the organ of hearing, and appears simultaneously or alternately with the manifestations of gout in other parts of the body. It occurs, therefore, sometimes as a sympathetic affection of neighbouring organs, and sometimes as the product of gouty metastasis. Should the inflammation develop itself rather on the external division, or lobe of the ear, the patient feels increased warmth, and an intolerable itching in the part. The latter symptom becomes more and more insupportable, and at

* Dr. Graves observes, " That the gouty diathesis may excite its specific inflammation in most of the tissues of our organs is a fact generally admitted ; but I regret to state that our knowledge concerning the effects which it produces in these various tissues is far from being accurate or extensive. Surgeons have done much towards elucidating its effects on the eye and its appendages." (But its consequences, when affecting the ear, either from metastasis, or originating in the head, in the form of headache, and subsequently of gouty otitis, as far as I know, have not yet been alluded to by any author, notwithstanding they are of daily occurrence.) " We are also tolerably well acquainted with its progress in serous, synovial, and fibrous membranes. What changes it produces in the secretions of mucous membranes is a question which has not been studied with attention commensurate to its importance."

length passes into a burning, tearing, and pinching pain, which spreads all over the circumference of the auricle. The patient also complains of constant tinnitus, and of some hardness of hearing. These symptoms increase considerably after midnight, and are not mitigated until morning. On examination, the external ear presents an erysipelatous redness; it feels hot, and is extremely sensitive to the touch. The entire surface of the meatus auditorius externus is found to present a redness, rather pale than dark; it is either entirely denuded of cerumen, or is covered here and there with a dark-brown thin and dried deposit thereof; the membrana tympani is of a dull appearance, and traversed by some large vessels. Should the inflammation continue at this low point, the epidermis of the meatus auditorius separates in mealy scales, or in larger portions, or becomes agglutinated with the diseased cerumen, which, after a time, is secreted in more than the ordinary quantity. If the inflammation become more intense, small abscesses or furuncles form and burst in the meatus during an exacerbation of pain, and there is eventually a discharge of pus. All the inflammatory symptoms are gradually mitigated after this, to be renewed only when a fresh abscess makes its appearance. In an old gouty patient at the Royal Dispensary, there was observed simultaneously a considerable swelling, which spread over the parotid and the mastoid process, was associated with a rose-coloured inflammation of the skin and cellular tissue, and prevented all motion of the lower jaw. In old and cachectic subjects, the parietes of the meatus are swollen and œdematous, and there sets in an obstinate mucous discharge. It is somewhat thick, almost without odour, flows not constantly nor equally profusely, but varies in respect to quantity. In damp or wet weather, or when the patients suffer from cold, the quantity is most considerable; when the atmosphere is dry and warm, the discharge on the contrary is very slight. If the otorrhœa be of long duration, polypous growths or granulations may form in the passage, springing generally from its parietes, but when the membrana tympani has been

destroyed in the progress of the disease, they may also rise from within the tympanum. In cases where there have been frequent relapses of the inflammation, varicose vessels become developed on the membrana tympani; the membrane itself being turbid and thickened, and assuming a dappled or spotted appearance, resembling a bit of patchwork.

This disease not uncommonly seizes on the middle ear, when it has been reflected as an arthritic inflammation from the throat or tonsil. If it be only of short duration, and the inflammatory irritation be but slight, the patient complains merely of dull pinching and lancinating pains in the ear, which become exacerbated in cold and damp weather, and diminish in severity when the atmosphere is dry: he complains also of a sense of fulness and tension in the ear, of a buzzing sound, of singing, and tinnitus, of instinctness of hearing, and burning pain and dryness of the fauces. The Eustachian tube is commonly open, but when pressed in, enters only with difficulty. If the inflammation rise to a higher degree, it commences with chill symptoms, and violent shivering, followed by heat and severe headache. Soon after, an almost insupportable aching, squeezing, and boring pain is felt in the interior of the ear, which extends to all the affected side of the head, the face, the teeth, to the gums, and the throat, and is greatly increased by attempting to speak or swallow. It continues a considerable time, returns after short intervals of rest, and has attained its acmé by evening, so that sometimes loss of consciousness, rambling speech, and even convulsions, are observed to take place. During this time the patient complains of increased sensitiveness to every sound of noise, and of sensations as from loud ringing, knocking, and buzzing in the ear, which render his state almost insupportable. Sometimes the symptoms suddenly abate, if a paroxysm of gout show itself in any other part of the body. The author has seen many cases where the affection of the ear disappeared rapidly after the occurrence of arthritic pains, at first in the shoulder, then passing down

the loins, to the knee, and to the toe.* When the inflammation attains its height, suppuration ensues. The pus ulcerates through the *membrana tympani*, and, with its escape externally, the disturbing symptoms gradually disappear. The pain then becomes more circumscribed, is confined more to the ear, and returns at longer intervals. The purulent discharge, however profuse it may have been, gradually diminishes; and if the disease be removed without much structural alteration or destruction of the osseous tissues, the hearing will be restored. The *tinntus aurium* and hardness of hearing continue the longest. As however the ear remains for a long time sensitive to every alternation of temperature, the inflammatory symptoms may sometimes return, and the discharge from the cavity of the tympanum, with its appendages, be re-established. In some cases effusion of lymph may take place, and caries even may occur.

If the arthritic inflammation of the ear run a more sub-acute or chronic course, it may happen that chalk-like concretions may form in the cavity of the tympanum or in the cells of the mastoid process, which may of course induce permanent deafness. Dr. Garrod has found the *meatus externus* filled with chalky matter, and the author has met with the same deposit in the cells of the mastoid process in elderly people. This disease however does not exist solely

* "A great variety of symptoms, classed by practitioners and authors under the name of the anomalous symptoms of gout, infest those persons in whom the malady is struggling for a vent. The gouty diathesis indeed almost invariably distresses the nervous system in a very remarkable manner; such symptoms are justly entitled to the name of anomalous, because they are not only subject to the infinite variety, but it is oftentimes from their irregularity, and the impossibility of reducing them to any known rule, that practitioners are disposed to suspect the existence of gout. Hemicrania, neuralgia, pains affecting the eyeballs, the ears, the fauces, the teeth, and the lumbar region, are all premonitory of gout. I have seen the tonsils so sharply seized with gout, as, in the absence of any considerable degree of inflammation, to induce me almost to accuse my patient of exaggeration, till an unequivocal symptom of gout explained the mystery. The same thing is frequently witnessed in the teeth. Odontalgia, (toothache,) without the smallest decay of these organs, owes its rise to gout. I have more than once seen perfectly sound teeth extracted in such cases without the least relief."—Gairdner on *Gout*.

in the chronic form, for we are occasionally called upon to treat it, when presenting symptoms of great severity and acuteness. They so much resemble those already described as indicating an attack of rheumatic inflammation affecting these parts, that it would be altogether superfluous to enter upon a serious examination of their nature and character.

Dr. Graves also gives a very curious case of what he calls "gout in the stomach" keeping up an alternate action with a swelling on the forehead, involving the cheek and eye. He adds:—

"I was consulted by an old retired excise officer, whose deafness was always relieved after a seizure of gout in the foot; on the cessation of this action, his imperfect hearing returned. This occurs regularly, but, with ordinary attention to his diet, I doubt not, it would become easy of management. When he is free from gout in his foot, the discharge from his ears is most profuse, and of a thin mucous character. This has been examined under a microscope, and always presents a gritty deposit—probably the phosphate of lime.

"As there can be no doubt, then, that a momentary congestion may produce a momentary pain, we may infer that, in many instances, gouty twitches are owing to some cause which determines an instantaneous congestion of the affected part. Sometimes the congestion is more lasting, and the pain is proportionally intense and persistent. Thus, the late Mr. Daly, of Henry Street, mentioned to me the case of a gentleman, the lobe of whose ear was sometimes attacked suddenly by gouty congestion, accompanied by agonising pain, but which never lasted more than a few hours. And I have myself recently suffered from a similar attack in the cartilage of the ear, which did not last longer than an hour, disappearing on the occurrence of gouty pains in the fingers."

Dr. Graves then proceeds to narrate a singular and interesting case of fatty enlargement of the lobes of the ears occurring in a young gentleman, who was also the subject

of fatty degeneration of the liver, from the effects of which he ultimately died.

There is another form of this gouty affection of the ear, which is more chronic and insidious in its progress; it is frequently met with after years of suffering from gout in the extremities; the diseased action in those parts gradually diminishes, and the patient then begins to complain of a singing noise and rustling sound in the ears, generally accompanied with headache in the morning, and giddiness. The distressing noise appears to the patient to be more external, or in the meatus, as it were, and not to be so deeply seated within the head, as it is found to be in the acute form of this complication.

It is also generally associated with imperfect hearing on one or both sides of the head,—it terminates, in the majority of cases, in confirmed deafness; whereas, on the other hand, if the nature of the diseased action be recognised early, and promptly treated, it is easily brought under control, so as to obviate the occurrence of any loss of function, or of change in the structural condition of the parts concerned.

The treatment in this chronic or subacute form of the disease, although chiefly dietetic and constitutional, must be also directed locally to the diseased organ. In some cases, as a precautionary measure, the abstraction of blood by leeches, from time to time, may be practised with advantage. Evacuant remedies have been in dispute for some time in the management of this disease, but for the safety of an organ so closely connected with the brain, and so obviously influenced by metastatic action, this prejudice is sometimes to be disregarded, if we desire to prevent further mischief. Stimulant applications to the joints usually affected with gout, should be freely and steadily employed, in order, if possible, to recall the disease from the more important organ to that or those which are of less direct value to the system.

With regard to the constitutional treatment of chronic

rthritic inflammation of the ear, the author has little to offer beyond what is generally practised in chronic gout, and so well laid down in the excellent and condensed treatise recently written by Mr. Spencer Wells *On Gout and its complications*. It may be added however, that in proportion as these means are judiciously and perseveringly adopted will the hearing improve, although it may be subject to variations under future attacks.

CHAPTER IV.

DISEASES OF THE THROAT IN CONNECTION WITH DEAFNESS.

THE diseases of the tympanum and its membrane being for the most part chronic, and constituting a large proportion of the causes of deafness, frequently commence in the throat, and extend thence through the medium of the Eustachian tube to the cavity of the tympanum, its ossicula, the chorda, and its membrane. Moreover, the remedies for the treatment of tympanic disease must be more or less combined with those which exert a curative influence on the throat. It will be necessary therefore to take into careful consideration the morbid affections of the throat, in so far, at least, as they are concerned in impairment of the hearing. The tonsil glands, which form a prominent portion of the structure of that part of the frame, have been spoken of by some authors as being largely concerned, when morbidly enlarged, in originating deafness by pressing on and closing the guttural openings of the Eustachian tubes, and their excision has been consequently strongly recommended and largely practised. We shall therefore have to inquire into the truth of this theory, in order that their pathological connection with this infirmity may be clearly understood.

An attentive, and especially an instructed observer, look-

ing into the throat, will readily make out—1, the uvula; 2, the pendulous palate; 3, the isthmus of the fauces, and the tonsil on either side; 4, still further back, the interior of the pharynx: all these structures are invested by a mucous membrane. Towards the base of the tongue may be seen two membranous folds (the pillars or columns of the fauces) descending from the soft palate. These inclose a triangular space on either side, in which the tonsil is lodged. There are moreover musculo-membranous folds; in the anterior fold is placed the constrictor muscle of the fauces; in the posterior will be found the palato-pharyngeus; the base of the tongue is below. Thus, these glandular bodies, the tonsils, are surrounded, as it were, on all sides, by muscular organs acting on and compressing them, and causing intense suffering when they happen to be acutely inflamed and enlarged. In chronic enlargements no such suffering happens, and their increase of size is scarcely known even by the patient.

Immediately behind the isthmus may be seen the interior of the pharynx, but more especially that portion of it which, extending upwards to the base of the cranium, and backwards and downwards along the front of the spinal column, communicates more immediately with the posterior nostrils and the Eustachian tubes. This is the cavity which the illustrious D'Zondi, one of the most practical surgeons of his day, viewed as distinct from the lower portion of the pharynx, being momentarily separated from it during the act of deglutition, by the action chiefly of the palate muscles, and of the palato-pharyngeal muscles. This temporary, and, as it were, momentary division of the bag of the pharynx into two cavities, distinct for the time being, becomes occasionally a permanent arrangement, as the result of adhesions of the palate and uvula to the posterior wall of the pharynx.

Before we can enter with advantage into the present inquiry, so as fully to understand the occurrence and extension of the particular morbid action now under consideration, the author deems it right to give a brief outline of

that part of the mucous membrane with which we are now engaged, as also of its leading sympathies, as well as of the muscular arrangement of the pharynx, since many cases of disease may be explained and readily accounted for by bearing in mind the nature of the several structures affected.

This membrane lines all those cavities of the body which communicate with the external integuments. Bichat divided it into two great portions—*scil.*, the gastro-pulmonary, and the genito-urinary. The former—that division with which alone we are concerned at present—commences at the eyelids, nose, and lips; the part going to the eyes communicating with the nose by the lachrymal canal, through which the tears flow. This same membrane also enters the cavity of the nostrils, forming the pituitary membrane, and, entering the apertures of the Eustachian tubes, lines the internal surface of the membrana tympani, as also the cavity of the tympanum. It then extends over the nostrils, lining the septum narium, and having entered the several sinuses in that direction, is again lost in the external skin about the nostrils. But before this takes place, it is continued into the nasal duct with its sac and the lachrymal ducts; and through the puncta lachrymalia is once more united with the common integuments. Here we may suppose the tunica conjunctiva to commence, which not only covers the anterior surface of the eye-ball, but is continued through the excretory ducts, even to the substance of the lachrymal glands. Again, commencing at the external integuments of the lips, with which we may for a moment suppose it to be lost, this same membrane enters the mouth, affords a covering to the internal surface of the cheeks, and to the salivary glands, whose ducts traverse it, as also to the tongue; it then continues its course posteriorly. Behind the soft palate the mucous membrane from the mouth and nostrils becomes continuous, and from the throat downwards it divides into two portions—the one to line the air-tubes, the other, the entire alimentary canal.

Observing the continuations of this membrane, and con-

sidering the manner in which the nerves, blood-vessels, lymphatics, &c., are distributed to it, we cannot but admit the existence of a principle of sympathy, by which the affections of one organ are transmitted to another; the advantage to be derived from this source in the employment of remedies will be readily recognised. On this point Müller says:—"A remarkable sympathy is observed to exist between the mucous membranes: thus their diseases, particularly the mucous discharges and the catarrhal affections, have a great tendency to spread in them. By virtue of this sympathy, the state of one part of these membranes may be ascertained by examining another, so that the state of the mucous membrane of the tongue indicates the condition of that of the stomach and intestinal canal. All the mucous membranes have likewise an extraordinary connection with the respiratory movements; thus, irritation of the mucous membrane of the nose produces sneezing; irritation in the pharynx, œsophagus, stomach, or intestines, excites the concurrence of the respiratory movements; vomiting, or violent irritation of the rectum, bladder, or uterus, gives rise to a concurrent action of the respiratory muscles, so as to effect the involuntary expulsion of the fœces, urine, or fœtus; irritation of the mucous membrane of the larynx, trachea, or lungs, or even itching from irritation of the Eustachian tube, excites coughing."

The mucous membrane, like the skin, is composed of three layers; the first, the epithelium, the cuticle of the membrane; the second is the *proper mucous*, or papillary layer, analogous likewise to the papillary layer of the skin. This is the surface which secretes and produces the epithelium. The third, the fibrous or submucous, similar to the corium of the skin, is intended to afford support to the papillary layer.

In the loose cellular tissue connecting the two latter layers, are placed the glands or follicles, which are peculiar to the mucous membrane. These glands are of two kinds, simple and compound. Henle thus describes the simple *follicles*:—"In almost every mucous membrane, even in

which are destitute of glands, there exist other organs, apparently connected with the secreting action of the membrane. They are round or oval closed cells, visible even to the naked eye, and sometimes quite transparent, but at other times filled with mucous globules." The compound cells, or glands, on the other hand, are thus described:—"The substances of these glands consist of a mass of round or oval completely-closed cells, of different sizes, and containing some granular matter, and other perfectly-formed mucous globules. A number of these cells united by cellular tissue, and perhaps also by a structureless membrane, form an acinus, and, as such, are seated upon a branch of an excretory duct, into which the mucous globules, and granular matter contained in the cells, are from time to time discharged, in consequence either of the membrane of the cells rupturing, or of its becoming dissolved at the part where it is connected with the duct."

These follicles are much more abundant in some parts of the mucous membrane of the air-passages and œsophagus; thus, the *tonsils* consist almost entirely of mucous follicles crowded together by cellular tissue.

From the anatomy of the parts as above described, we now go on to notice the *morbid alterations in the condition of the mucous membrane lining the mouth and throat*. The mucous membrane which lines the throat is of a slightly pink or pale rose colour, in its normal or healthy state; but when it becomes the seat of inflammation, its colour is changed to red, as it then passes from the naturally healthy hue to deep scarlet, and eventually to a purple or violet colour, according to the nature, character, and intensity of the inflammation. It may be observed here that inflammation may attack any part of the structure of the mucous membrane separately; either the mucous membrane itself, the mucous follicles, or finally the subjacent tissues. Inflammation of the mucous membrane itself is, generally speaking, spreading and diffusive; whilst inflammation of the mucous follicles, on the contrary, is circumscribed in its

action. It sometimes happens, in the case of inflammation of the mucous surface, that the follicles may also take on the inflammatory process, and in this case, after the superficial inflammation has abated, it still may remain in the chronic form in the follicles.

After it has continued for some time in a mucous membrane, the lesion most frequently to be observed is a morbid thickening of the part affected; its surface also often presents a granular appearance. To this lesion it will be necessary to direct attention, when that form of deafness is treated of, for the cure of which excision of the tonsil has been recommended.

Having thus endeavoured to give such a description of the distribution of the mucous membrane of the mouth and throat, as may suffice to make it clear how far the function of hearing may be interfered with by disease of this membrane; having traced it in its various divisions and continuations through the nares, the sinuses, and the Eustachian tubes; having tried to make clear the various sympathies, contiguous and remote, with different other parts of the body; having also exhibited in sufficient detail the chief lesions produced in the mucous membrane by inflammation, both acute and chronic,—the author will next endeavour to point out the lesions of this structure most likely to affect the organ of hearing, and the manner in which that effect is produced.

As has been already said, we have seen that, like other membranes of the body, the mucous membrane of the mouth and throat is liable to various degrees and kinds of inflammation, both acute and chronic, common and specific; on closer investigation, we also find that inflammation of this membrane is further modified, partly by its various and extensive sympathies with other organs, and partly by constitutional causes. Scrofula, rheumatism, and several skin diseases, the exanthemata, as scarlatina, measles, and small-pox, as also influenza, affect it more or less, and are observed occasionally to give rise to severe and per-

manent disease, with the function of hearing much impaired, and not infrequently with total destruction of the auditive organ. Every practical surgeon is well aware of the effects produced by the morbid poisons on this membrane, when they have deeply tainted the constitution.

It is quite unnecessary here to urge the very great importance which this membrane sustains with reference to the function of hearing, as we shall have occasion to show that a large proportion of the cases of deafness met with in practice actually depend entirely upon inflammation of the mucous membrane of the throat extending through the Eustachian tubes to the cavity of the tympanum, and proving incurable, until due attention has been given to the extension of the disease throughout the whole cavity of the fauces. This membrane also covering the tonsil, and entering so much into its composition, is commonly associated in its inflamed condition with the enlarged gland, as well as with deafness, so much so, that the deafness has been somewhat hastily attributed to the closure of the mouth of the Eustachian tube by the enlarged tonsil; but how much more simple and obvious is the explanation founded on the extension of the inflammation through the whole lining of the tube to the tympanic cavity.

When we consider the anatomical relations of the tonsils to the Eustachian tube, it becomes difficult to conceive any way in which the enlargement of the former can so press upon the expanded extremity of the Eustachian tube as to cause deafness. In the first place, the form of this trumpet-like opening carefully preserved by its cartilaginous and fibrous structures, and in the second place, its size, being nearly half an inch in its longest diameter, both militate against the probability of its becoming closed under ordinary circumstances. But when we reflect on the relative position of the orifice with the tonsil, the latter hanging at least an inch below the former, and when enlarged extending downwards and forwards rather than upwards, it is difficult to conceive that the gland can by its enlargement *block up* an opening which is above it and

altogether out of its way. The accompanying figure shows the relative positions of these parts.

FIG. 13.*



The following quotation from Kramer will confirm these views, which are also fully held by Toynbee, Wilde, and other writers:—

“I altogether deny the connection of closure of the Eustachian tube with enlargement of the tonsils. I have frequently seen this enlargement, both with and without the least dulness of hearing, but always with the Eustachian tubes perfectly free. I confess that I cannot at all comprehend how swollen tonsils should press together the mouth of the Eustachian tube, and close it against the admission of air, and may assert, that none of the practitioners who have admitted such mechanical effects have ever satisfactorily investigated, by means of the catheter, the closure of the Eustachian tube in any one single case

* For description, see Appendix.

of the kind. This reproach applies even to Itard; from his very defective method of investigation, he ought not to have been surprised that so frequently *no amelioration of the dulness of hearing occurred in those cases in which he attempted to cure it by excision of the tonsils.*"

But, independently of anatomical considerations, the author is fully borne out in this opinion by the numerous facts which have occurred in his own practice, some of which are related in detail in his work "On Excision of the Enlarged Tonsil as a Remedy for Deafness," wherein he shows:—

1. That the enlarged tonsil does not, *per se*, give rise to imperfect hearing.

2. That its extirpation not only does not remove deafness, having almost uniformly proved a failure, but, on some occasions, causes the loss of hearing, or at least an impairment thereof.

3. That in cases wherein the tonsil is enlarged, the disease is in the mucous membrane generally, and that the enlargement of the gland, when remediable, is so, only by means of a judiciously-regulated constitutional treatment.

4. That the tonsils are not merely secreting organs, but play a further and most important part in the animal economy, holding, as they do, most intimate sympathies with important though distant organs.

5. That extirpation of the tonsil in the young has led to pernicious results, such as giving rise to bronchial and pulmonary disease, with other mischiefs mentioned in the work above alluded to.

The *first* of these propositions is demonstrated by the details of four cases, in which the tonsils were considerably enlarged and no deafness existed; cases such as these may be met with in every school. In one which came under the author's notice, the tonsil on the left side was considerably enlarged, in a gentleman, *ætat.* 29, while at the same time on that side the hearing was perfect; on the right side *however there was no increase of size in the tonsil,*

and yet his hearing on that side was very much impaired.

The *second* proposition is proved by allusion to three cases in which permanent deafness, more or less complete, resulted so directly from the removal of the tonsils as to be clearly shown to have been caused by the operation; numerous other instances are known to the author.

The *third* proposition, relating to the disease in the mucous membrane, will be further noticed as we proceed.

The *fourth* and *fifth* propositions, to the effect that the tonsils, holding an important place in the animal economy, cannot be extirpated without danger of certain pernicious results, is proved by physiological facts, as well as by cases which have come under the author's notice, where, after the extirpation of the tonsils, the results were not only of no advantage, but, on the contrary, such as were much to be regretted.

It appears therefore, from these considerations, that there is no foundation for the theory that an enlarged

FIG. 14.*



* For description, see Appendix.

tonsil is a common cause of deafness, and therefore the operation of excision with a view to the restoration of hearing is by no means to be recommended as a rule of practice.

We may now proceed to consider the morbid affections of the throat in so far as they are concerned in impairing the hearing, and it will be seen that in all these cases the mucous membrane bears a prominent part, not only in its acute, but particularly in its chronic form.

The acute affections of the throat, liable to be conveyed through the Eustachian tube to the tympanum, may be divided into two classes, the *exanthematous* and the *catarrhal*. The *exanthematous* form, which occurs in scarlet-fever, and more rarely in measles, has already been discussed. The *catarrhal*, of which influenza is the type, will now come under discussion.

CATARRHAL AFFECTIONS OF THE THROAT AND MIDDLE EAR.

The history of this complication of deafness is generally as follows:—The patient takes what is called a common cold or catarrh, either from exposure to cold or damp, or to epidemic influenza. The mucous membrane of the throat, in common with that of the nostrils and pharynx, becomes actively inflamed. The inflammation extends through the Eustachian tube to the tympanum, where it may produce the same symptoms as scarlatina, viz. suppuration and the ultimate bursting and sloughing of the membrane of the tympanum and the contents of the cavity.

When deafness therefore occurs in influenza or catarrh, with pain in the ear and other symptoms of inflammation, the treatment should be active and energetic. Leeching and counteraction behind the ears, with the usual aperients and febrifuge medicines internally, will be proper; and for the rest, the treatment described under the head "*Scarlatina*" should be followed according to circumstances.

In *influenza*, as the catarrh assumes a sort of epidemic character, so there are some peculiarities connected with its course when the ear becomes affected, which are worthy of notice. When influenza sets in during the autumn or winter months, the affection of the throat frequently exhibits a rheumatic character, and the structures of the ear are particularly subject to its aggression; the membrane becomes sometimes dry and sometimes granular; this appearance is continued up to the internal lining of the tympanum, after having produced a thickening of the sides of the pharynx, and frequently enlargement of the tonsil. The same consequences are observed to take place in the scalp and pericranium, and perhaps even in the meninges. But as the attack is generally attended with an asthenic condition of the constitution and great debility, we are precluded from treating it more actively than by blisters or by colchicum, the latter to be applied both locally to the part most affected, and also to be given internally; the author has also known otitis to occur, and sometimes abscesses to form in the glandular system, more frequently in the parotids, producing great pain over the head, with tenderness of the pericranium, and accompanied by catarrhal and laryngeal irritation in the chronic form. When the patient experiences a dryness of the nostrils and soreness of the throat, accompanied with a dry cough, and pain of the ears on one or both sides, then our attention is more particularly called for.

The condition now described is attended with considerable dulness of hearing; it may occur suddenly, or come on very gradually, during the course of the influenza attack, affecting one or both ears, until it arrives at so high a degree, as to occasion considerable inconvenience to the patient. It may so happen that one ear only suffers, the other not participating in the diseased action. Noises in the ears are present during the whole course of the disease, and often continue to distress and harass the patient for some time after the convalescence. This symptom however does not necessarily indicate any serious or unfavourable change in the

structure of the organ ; it may be referrible to chronic inflammation about the fauces and soft palate ; they appear swollen, and the uvula is considerably relaxed.

Before describing the affections of the ear produced by chronic inflammation of the throat, it will be necessary to call the attention of the reader to the anatomical structure of the important and extensive membrane which lines the throat, the fauces, the nose, the Eustachian tube, and is even continued into the tympanum, as already described, p. 150.

The follicles or glands, which lie in the loose cellular tissue between the layers of this membrane, are generally the seat of the sub-acute or chronic inflammation when it attacks the mucous membrane investing the throat and its appendages ; they may continue to be the seat of inflammation for a longer or shorter period, causing a certain degree of change in the intonation, and more or less inconvenience and annoyance in swallowing, but not sufficient to amount to absolute pain ; when the inflammation occurs in the chronic form, and the symptoms make but a slow and gradual progress, the functional alterations are scarcely perceptible to the patient or to those around him, but are much more readily discoverable by comparative strangers ; after the disease has continued for a certain time, it is frequently the cause of a chronic tubercular affection of this structure, to which the author is more particularly anxious to direct attention—a condition ably described by Dr. Greene, under the name of follicular enlargement. It is this condition, and the habit of body accompanying it, that so often terminates in enlargement of the tonsil and elongation of the uvula—more particularly in children after the eruptive diseases ; and which by its extension to the Eustachian passage and tympanum, not only produces dulness of hearing, but sometimes causes the destruction of the organ itself. This morbid action of the mucous membrane the author has traced in some cases by dissection to the middle ear, and has found that it produces a granular appearance throughout the membranous expansion.

The *local symptoms* of this disease are, a dryness of the

throat, a huskiness in the voice, and generally a nasal intonation; the tonsils are frequently enlarged, and the mucous follicles both on these glands and on the surface generally, are enlarged and prominent, being sometimes aggregated into little masses nearly as large as a peppercorn. The uvula and velum are generally relaxed. The redness exists in patches, and is not equally diffused. This state of the mucous membrane often extends behind the velum to the back part of the nostrils, and upon inspecting the nares the membrane may be seen to be so much thickened as to be mistaken for polypus. The Eustachian tube is more or less obstructed. The hearing is very imperfect on one or both sides, and the patient complains of noises in one or both ears. The meatus rarely presents any deviation from a healthy appearance, so that the deafness can only be explained by the condition of the throat and Eustachian tubes, whether the latter be obstructed or not. In other instances the meatus is dry and granular, and appears to participate in the disease. The membrana tympani is always opaque, from a deposition on its internal surface.

The *constitutional symptoms* are not less strongly marked. The patient is often debilitated, always strumous. The digestive organs are more or less deranged. There is little or no appetite, and the bowels are often irregular. The skin is generally dry and uncomfortable. The patient often complains of headache, listlessness, and exhaustion. The spirits are depressed, and the countenance pallid and ex-sanguine. When the disease attacks young children, it is accompanied with enlarged tonsils, an offensive discharge from the nose and sometimes from one or both ears; but it does not occur so frequently among children as adults, and it is common among clergymen and public speakers.

The *diagnosis* is favourable in all cases in which there are facilities for proper and persevering treatment. Not only will the throat recover, but the hearing may be restored.

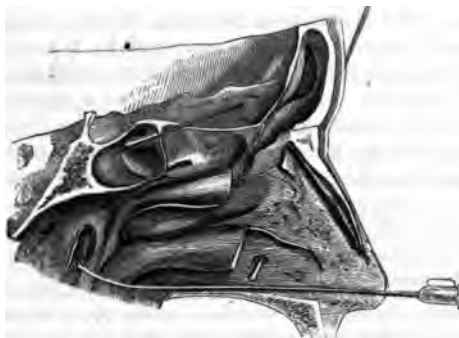
Treatment.—The indications are, first to restore the general health by means adapted to the case, such as would occur to any enlightened practitioner, independently of any

knowledge of the local disease, such as tonics for the weak, alteratives and stomachics for the dyspeptic, and especially the compound tincture of guaiacum when the tonsils are inflamed, as recommended by Dr. Woodfall, of Maidstone.*

The *local treatment* however is not only of essential importance, but the degree of progress towards recovery will chiefly depend upon it.

First, it is of great moment to guard the practitioner against the too common error that the Eustachian tubes in this disease are considerably narrowed, and sometimes entirely closed; the first impulse of the surgeon being in such a case to reöpen them by passing the Eustachian catheter. This however should never be done in the first instance; it is apt to increase the inflammation, and to add to the previous thickening of the lining membrane of the tube, instead of rendering it more pervious. The view entertained by many continental and some English surgeons of passing medicated fluids, vapours, &c., through the Eustachian passage by means of the catheter, is far more frequently talked of and described in books than accomplished, as is proved by the frequent failures as the too general results of such attempts. The accompanying wood-cut will show that when

FIG. 15.



* Dr. Woodfall states "that gualacum is a remedy of great value in *Cynanche*

the guttural orifice of the tube is in a normal condition, it can be entered with facility; but when the tube and all the parts in its vicinity are more or less blocked up and distorted by the disease above described, the case is widely different. Reflecting on this difficulty, the author was led to contrive some other way of medicating the diseased membrane and overcoming the obstruction. The mode which has appeared to him to be attended with the most satisfactory results is that of *fumigation*. This method of treatment and its beneficial results are well illustrated in the following cases.

Case.—J. B., ætat. 14, of strumous habit, consulted the author in the summer of 1852 for occasional deafness, which had attacked him three or four times a year for the last seven years, the attacks generally lasting three or four weeks. Upon examining the external ear, it was found that the meatus of each ear was dry and void of ceruminous secretion, and the membrane of the tympanum opaque. On inspecting the fauces, the tonsils were seen to be enlarged, the uvula elongated, and the mucous lining of the fauces thickened, corrugated, and secreting a viscid mucus, which, when separated, left the parts dry and harsh. By this general fulness of the parietes of the fauces, the opening of the throat was considerably contracted. The Eustachian passages, though contracted, were both pervious, as was ascertained by the otoscope. The boy's health was often impaired, his voice was thick and husky, and there was apparent at all times a general want of tone in the system and a discharge from both nostrils.

The patient was directed to apply to the throat, night and morning, a fumigation medicated with iodine and guaiacum,

Tonsillaris, and if employed sufficiently early entirely prevents suppuration from taking place. I was first led to use it from reading some papers by Mr. Nunn on the subject, and I then prescribed, as recommended by him, the powder suspended in mucilage. On visiting a dispensary patient however, a poor Irishwoman, with a severe attack of quinsey, I found her quite unable to swallow the adhesive mixture which had been sent her. I therefore substituted the compound tincture, and with such good effect that I have employed it in similar cases in doses of ʒi. xl. to ʒj. ever since, and have rarely known it fail to relieve all the urgent symptoms within six-and-thirty hours."

and to continue it until it produced cough and irritation ; by way of adjunct he was ordered to use a salt shower-bath every morning, and to take a dose of an iron mixture twice a day, with an occasional aloetic purge. After this treatment had been pursued for a month the boy's health improved, his voice became more sonorous, the tonsils were reduced in size, the general condition of the throat was much improved, the pharyngeal aperture became wider, the deafness gradually wore off, and—to this the author would call particular attention—the ceruminous secretion of the external meatus was restored, although no application was made thereto.

In this case the cause of deafness might have been hastily attributed to the enlargement of the tonsils, which glands would then have been in considerable danger of extirpation by the hand of the surgeon, as happened in the following unfortunate case.

Case.—The writer was consulted a few months ago by the parents of a boy eleven years of age ; the lad had recently undergone the operation of excision of the whole of the left tonsil by a surgeon, who also proposed to remove the remaining gland ; but the parents finding no advantage from the operation, and observing that the health of the child was deranged, objected to a second operation. On examination, the right tonsil was observed to be enlarged, the hearing on that side being only slightly impaired, whereas on the left side the hearing which before the operation was quite as little defective as on the right, had become almost destroyed since it was performed, apparently in consequence thereof. It appears from the history obtained from the parents, that the lad had been slightly deaf in both ears for some years, the degree of deafness being always aggravated by any increase in the size of the tonsils, and of the huskiness of the voice, both which disorders had been contemporaneous with the deafness. The external ear was normal in appearance, but the membrana tympani was slightly opaque. The Eustachian tubes were both

open. The health was somewhat, though not materially, impaired. The boy looked ill and pale, but his functions were tolerably well performed.

The treatment adopted was the same as in the former case. The boy's health improved, and the hearing on the right side was perfectly restored, but no improvement could be effected on the left—the side, namely, from which the whole of the tonsil had been removed.

Case.—The following case, which the author saw in consultation with a surgeon of eminence, will further illustrate this very common form of throat-deafness. A clergyman's son at Rugby School, seen in his 17th year, had suffered from absolute deafness on the left side from childhood, originating in scarlet fever. Deafness in a less degree had also existed in the right ear for about twelve months, consequent on taking cold while playing at cricket. The throat, in this case, presented pretty much the same appearances as in case p. 161. The tonsils were both enlarged, and the mucous membrane generally thickened and granular. The Eustachian tubes were both slightly pervious. In the external meatus of each side there was observable a dryness and thickening of the membrane of the tympanum, with opacity. On the left side, otorrhœa had formerly existed, and the general health was considerably disturbed. The ears had been diligently syringed, blisters had been applied to the mastoid process, and unctuous applications had been introduced within the meatus. Afterwards, nitrate of silver was applied to the fauces, and astringent gargles were ordered. This treatment, combined with mercurial and other purgatives, had been pursued for six months, without affording the slightest improvement.

The fauces were now fumigated twice a day with iodine and guaiacum for a period of two or three months, and a salt shower bath was prescribed, as also astringent gargles. The compound iron mixture, with the aloetic decoction, was prescribed to be taken twice a day; at the end of three months the hearing on the right side was perfectly restored,

the condition of the throat was much improved, and the voice had lost its huskiness; but the tonsils remain more or less enlarged to the present time.

What is the cause of deafness in these cases? It is not the enlarged tonsil, for in one case this was removed not only without benefit, but with apparent injury; and in the last the tonsils remained swollen after the hearing had been restored. It was not the condition of the external meatus, for in case p. 162, the meatus was healthy, and in neither case was any application used to it. It was not a thickened condition of the membrana tympani, for the opacity observable remains in each case, although the deafness has been cured. It was not from closure of the Eustachian tubes, for they were pervious in each case. It was not from organic lesion of the ossicula, nor of the osseous structure of the labyrinth, for that would not have yielded to treatment. We are therefore driven to the conclusion that the affection of the throat had extended through the membrane of the Eustachian tube, which was in some degree thickened, to the membrane lining the tympanum. The character of the inflammation in these cases, of which many instances have come under the author's observation, is not acute, but consists rather of slow congestion, terminating in granular deposition.

In the following case, both tubes were obstructed, but the disease yielded to similar treatment.

E. J., *ætat.* 27, applied at the Dispensary, in November, 1853. She was then so deaf in the left ear, that the tick of a watch was inaudible to her even when it touched the ear. On the right side she could not hear the watch beyond two inches distant. The history of her case was as follows:—Deaf from seven years of age with otorrhœa on both sides, with a similar discharge from the nostrils, and enlarged tonsils, with nasal intonation. At the age of 17, the otorrhœa ceased spontaneously, but she became increasingly deaf. One tonsil had been excised, the other repeatedly cauterised. On inspecting the pharynx, it was observed to be dry, and the follicles were prominent. She

complained of noises in her ears and headache. The health was generally deranged, and the habit was cachectic and debilitated. The membrana tympani was thickened and opaque, and slightly concave. The Eustachian tubes were closed on both sides. The meatus was not deficient in cerumen. Having prescribed some aperient medicines for a few days, the author directed the throat to be fumigated with iodine night and morning, and afterwards an astringent gargle to be used; and the compound iron mixture twice a day. By the end of three months she had recovered her hearing on the right side, and on the left it was considerably improved. She now hears perfectly on the right side, and tolerably well on the left. The throat is well, the tubes are both pervious, and her health is re-established.

As catheterism was not practised in this case, it is evident that the Eustachian passages were cleared by the fumigation. This result is by no means singular.

It may perhaps be necessary to describe the manner in which the fumigation was used in these and similar cases. A common inhaler is employed, only that the mouth-piece is attached to a tube composed of glass, and longer than those in common use. Into this half a pint of boiling water is introduced with half a drachm of compound tincture of iodine; the patient then closes his nose, and introducing the mouth-piece into his mouth breathes the steam for a short time, the strength of the fumigation being regulated by the irritation it produces. Care should be taken that the vapour is not too hot. In some cases, where a rheumatic or gouty diathesis prevails, half a drachm of the tincture of guaiacum should be added. If much irritation be produced, it may be necessary to suspend the inhalation for a few days, and then resume it. A warm astringent gargle should generally be used after inhaling, and, if the follicles be much enlarged, a solution of the nitrate of silver in the proportion of a scruple to an ounce of distilled water should be brushed over the whole surface of the fauces.

The author may here be permitted to recommend to the *attention* of the surgeon, the utility of the iodine and

guaiacum fumigation above described in the deafness and tinnitus connected with the hoarseness so common to clergymen and public speakers, also to singers:—he may add, that this remedy is not less useful when disease affects the throat only, and has *not* extended to the Eustachian tube, and the patient is not deaf.

OBSTRUCTION OF THE EUSTACHIAN TUBES.

In cases where the Eustachian passages are blocked up, will not yield to the fumigating process, and cannot be inflated by the efforts of the patient, it may be needful to introduce the Eustachian catheter. In a very small proportion of cases however will this operation be attended with any real service, and those surgeons who expect to be able to overcome the so-called “strictures” of this canal, on the same principles on which they treat successfully strictures of passages which are surrounded with soft parts only, appear to have entirely overlooked the anatomy of the parts on which they are operating. The obstructions sometimes take place in the bony portion of the tube, and consist, as Mr. Saunders observes, “in an inordinate ossification filling up the canal.” The author’s experience warrants him in the belief that nearly all the obstructions in this passage which are not to be overcome by the simple means recommended in the last section, consist of exudation in the tympanic extremity of the canal, or of a thickening of the lining membrane, from inflammatory deposition. For what purpose then can it be proposed to attempt to force a metallic catheter through this indurated structure? And who can be surprised that false passages have been made by such attempts, and that air has been admitted into the cellular membrane of the neck and throat by this procedure? In still more severe terms the author feels it his painful duty to comment on the use of the ugly machine called an *air-press*, introduced by our continental neighbours, and unhappily adopted for a time by some *English surgeons*, the intention of which was to

force the "stricture" by pumping air through it;—an operation which, when it succeeded in this object, ended, as might have been expected, in the worst consequences.

In Mr. Pilcher's work "On Diseases of the Ear," the case of Jane Edwards, who had been deaf for some years consequent on sore throat while labouring under small-pox, is detailed. Some very disagreeable mawkish matter was occasionally expectorated, giving a sensation as if it came "from the back of the throat, high up," the hearing being always better afterwards. She could with difficulty, and but occasionally, force air into the tympanum. The auditory canal and membrane were quite healthy. The catheter was passed readily into the tube, without giving rise to the least pain, or occasioning the loss of a drop of blood; she thought she heard better while the instrument was in the canal, and felt the air, and afterwards the water, which were injected into the tympanum; she left with full hope of obtaining relief. In about five minutes, upon blowing her nose rather violently, the integuments of the cheek became suddenly emphysematous, the swelling extending down the neck, producing an appearance somewhat resembling the goitre; it reached the thorax and abdomen, and both upper extremities were especially distended and stiff, the respiration was somewhat interfered with, and deglutition for a few hours impracticable. The emphysema continued for several days, when the air was gradually absorbed, leaving no inconvenience.

It might be suspected that in this case an old cicatrix, in the immediate vicinity of the mouth of the Eustachian tube, must have been broken by the catheter, notwithstanding the instrument passed with unusual facility, and that the air forced into the exposed cellular tissue by expiration in blowing the nose, and which subsequently escaped in breathing, was extravasated in the manner described. The unpleasant and even the alarming effects produced in this case, he adds, illustrate the necessity of the practitioner observing the greatest care and delicacy in the introduction of the Eustachian catheter.

The explanation thus offered is perfectly admissible, and is probably correct in this case; but it may be added, that in other cases where more or less general emphysema has followed the use of the Eustachian catheter, with the injection of air or water, or of both, there has not been any reason to suspect the existence of any cicatrix in the throat, whether old or new, and therefore the presence of air in the cellular tissue of the body must be more appropriately attributed to some error or carelessness in using the instrument, more especially the air or water press, than to any other cause. The history of two cases of death thus caused in London some years since is a sufficient caution.

The mode of introducing the catheter is as follows:—The patient should be seated in a chair with his head well supported. The catheter should be held in the right hand, and the patient being directed to open his mouth widely, the beak of the instrument, previously warmed, should be introduced into the nostril on the side affected, with the convexity upwards, and passed steadily over the floor of the nostril in a straight line until a depression be felt. The point of the instrument is then to be turned outwards towards the ear, and immediately afterwards a little upwards into the canal. The direction of the beak of the instrument will be best ascertained by observing the position of the ring of the handle. If the first attempt fail, which it easily may in inexperienced hands, it is better to desist for the time than to irritate the parts by repeated endeavours. That the beak has entered the tube may be ascertained by placing the otoscope over the external ear, and then blowing air through the catheter. The otoscope will tell whether any air has been forced into the tympanum. It is scarcely requisite to add that it is necessary that the patient should be perfectly quiet during the operation, as the slightest movement will derange the instrument, and may cause considerable mischief.

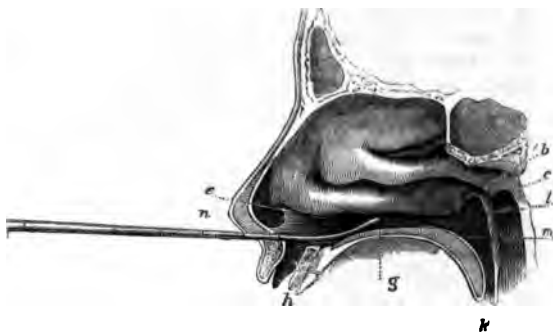
M. Triquet, in the work previously alluded to (page 115) after describing the operations for Eustachian catheterism recommended by Itard, Gairal, Kramer and Ménière, all of

which he considers more or less open to objection, next mentions the mode of proceeding he is in the habit of pursuing, and of which, he says, that although not perfect, it is in his opinion less liable to criticism than the others. He seems to have caught the idea on which his operation is based from a passage in the "Médécine Opératoire" of Velpeau. Having examined a great number of heads, he has always found, he says, that the inferior meatus from *e* to *l*, (Fig. 16) and the pharyngeal orifice of the tube *b* are exactly on the same plane in the same prolonged line, so that if the lower turbinated bone were to extend sufficiently from *l* to *b*, the catheter, its beak being carried along on the under surface of the turbinated process, or on the upper surface of the meatus, could not fail to reach the pharyngeal orifice of the tube *b*; but the turbinated process, or rather the meatus of which it forms the boundary, and which serves as a *point d'appui*, ceases about two or three lines short of the tube, so that on the external wall, at the back of the turbinated process of the inferior meatus, there is a small space from *l* to *b* where the catheter may slip. This inconvenience may be thus guarded against:—We must always rest the beak of the catheter against the external paries or wall of the meatus, without even once withdrawing it from it; we should proceed very slowly, especially when the point of danger *l* has been reached, and should the beak of the catheter encounter in its passage a small valvular mucous fold near *l*, the progress of the instrument should be stopped for a while, until it has been freed by a lateral rotary movement, the beak being still rested against the external wall; on no account should it be forced through the fold. In order to pass safely over the small space from *l* to *b* where there is no *point d'appui*, experience has shown that the back of the catheter should rest against the septum, and being thus supported, it may be carried on safely.

Operation.—The patient is placed, with the head resting against a support, the surgeon holding the catheter *a* like a writing pen, passes it into the orifice of the fossa, the concavity downwards, the convexity upwards. The curve of the

is a very slight one however, in order that it may freely under the turbinated bone. When it has reached to *g*, it should be completely rotated, so that the cavity may be turned outwards and upwards, and the cavity downwards and inwards. If this movement were made, the point of the instrument might strike against the mucous fold at *l*, which obscures the lower part of the nasal cavity. When this rotary movement has been made, the point of the instrument passes onwards, resting against the external and upper parietes of the meatus and of the turbinated bone, which serves as a sort of canal for it; it thus reaches the point *l*, it must then pass more slowly, and have its point pushed with the back of the catheter against the septum, so as to be more secure of its movements. Near *l* will be almost always found a small valvular mucous band, which should be pushed slowly with the point of the instrument, without its necessity to press against the external paries of the meatus; the instrument is still to be carried in that direction *slowly*,

FIG. 16.



y, without force, and it will most certainly fall of itself the pharyngeal orifice of the Eustachian tube. Such is Triquet's description of the operation he recommends.

In order fully to understand its capabilities, and to use the instrument with dexterity, all that is necessary is, to perform it on a preparation of half the head, the parts concerned being laid open, as in the engraving.

When the obstruction in one or both tubes cannot be removed, a very great degree of deafness must result, in consequence of the cavity of the tympanum having no outlet or access to the external air, so that the vibration of the membrane is in a great measure prevented. In such a case the late Sir Astley Cooper proposed and practised an operation for letting in the air by puncturing the membrana tympani.

PUNCTURING THE MEMBRANA TYMPANI.

This operation having been referred to in the last section as a remedy proposed by the late Sir Astley Cooper for deafness arising from permanent obstruction of the Eustachian tubes, we may now describe this surgical proceeding, and discuss its utility. Although there can be no doubt that the idea sprung up as an original thought in the mind of that celebrated surgeon, he cannot be said to be the first proposer of the operation. It may be stated on the authority of Mr. Wilde, that Degrauers not only punctured, but completely removed the tympanal membrane, but for what purpose it does not appear ; while Riolanus proposed it even before Degrauers did. No sooner had Sir Astley Cooper introduced this operation, than it was practised indiscriminately in all cases of deafness, and thus fell into great discredit. Upon a close investigation of the cases published by Sir Astley and other surgeons, we are driven to the conclusion that the success of this operation has been greatly over-rated ; nevertheless the perfect restoration of the hearing in the case of Mr. Round, as related by Sir Astley Cooper, in which there was an absolutely impervious condition of the Eustachian tubes in connection with congenital imperfection of the structure of the fauces, which rendered him incapable of blowing his nose, while the

nervous structure of the ear was in a normal and healthy state, would seem to point out the conditions under which this operation may be practised with a fair prospect of success. This indication receives additional strength from the fact that whenever there has been disease in the organic structure of the ear itself, whether of the tympanum or the labyrinth, the operation has been perfectly useless, although it has been recommended in morbid thickening of the membrana tympani. In many cases of Eustachian obstruction it has appeared to be successful for a few days, but has ultimately proved a failure. Probably in these cases the aperture has been allowed to close, as it has been found that this membrane when wounded has a strong tendency to heal, even although the perforation made by the operator be a large one.

Before determining upon this operation in any given case, it ought to be ascertained, if possible, whether the cause of the obstruction in the tubes be or be not of a syphilitic origin. It is the opinion of Mr. Saunders, that "the obstruction of the tube (when it is permanent) most frequently arises from syphilitic ulceration in the throat or from the sloughing which complicates the *Cynanche maligna*."* In some instances doubtless where the history of the case reveals a syphilitic origin, a due administration of mercury ought to be tried before resorting to any operation, particularly as the osseous structures may possibly be involved in the disease.

It must also be borne in mind, before resolving upon the operation, that perfect obstruction of these tubes is a condition which cannot easily be proved to exist, there being no certain guide by which it can be ascertained. The incapability of inflating the tympanum only renders it probable; but when this is associated with deafness, it becomes still more probable, especially if the nervous structure of the ear can be proved to be intact by the patient being able to hear the tick of a watch when brought into contact with the head. Some persons cannot under any circumstances in-

* Saunders on the Ear, p. 42.

flate the tympanum although the hearing is perfect ; further inquiry therefore should be made.

Operation.—In the performance of this operation, which requires very delicate manipulation, there are three indications:—1. To avoid the manubrium of the malleus, and for this purpose the anterior and inferior part of the membrana tympani should be selected. 2. To make such an opening as shall prove sufficient and permanent, neither so large as to interfere perceptibly with the vibrations of the membrane, nor so small as to heal immediately, there being always a tendency in incised wounds of this membrane to close rapidly. 3. That no mischief should be done. To secure this object, it is requisite that the patient should inflate the tympanum, if it be practicable, as in cases of thickening of the drum, that the instrument should be furnished with a guard, that the speculum should be used, and that the operation should be done quickly ; for if the patient should move his head in the slightest degree while under the surgeon's hands, a wrong direction may be given to the instrument, and mischief may be effected. Some surgeons, in order to secure the permanence of the opening, have proposed a kind of drill, others a trocar, and others a curved knife, none of these instruments being furnished with a guard. Others again have advised and practised the excision of a small portion of the membrane. The author has been accustomed to use a stilette with a transverse guard, here delineated.

FIG. 17.*



There are three advantages in employing this instrument:—1. The operation may be performed quickly. 2. There is no danger of the instrument wounding the lining

* This instrument can be procured from Mr. Ferguson, surgical instrument maker, Smithfield.

membrane of the tympanum. 3. The breadth of the instrument secures a sufficiently large opening.

This operation may be required not only in cases of obstruction of the Eustachian passage, but whenever there is evidence of such an accumulation of purulent matter in the tympanum as shall endanger the integrity of the membrane or of the tympanum and its contents, as in cases of myringitis from scarlet fever, or other causes. It is also employed in cases of thickening of the *membrana tympani*.* There is likewise a condition of the parts in which, although an opening already exists in the membrane with an obstinate otorrhœa, the author has found great advantage from introducing the stilette above described through the small aperture in the membrane, so as to give a more free exit to the pus, which appears to have issued from a kind of fistulous cavity between the layers of the membrane. In several such cases the membrane has rapidly healed after the incision, the discharge having previously ceased. Mr. Saunders observes, that "there are some dubious cases of deafness in which a surgeon would reluctantly refrain from taking the chance of this operation affording relief: in such he cannot do wrong by piercing the *membrana tympani*; it has been found that its disposition to close is very great, even when the Eustachian tube is impervious; it is still greater when the tube is open; it is generally re-united in three or four days. But if the opening should remain fistulous, no injury results from it.†

There are but few disadvantages or untoward accidents to deter the surgeon from having recourse to this mode of affording relief; at the same time it may be said, that it should not be practised if the external meatus, the membrane itself, or the tympanum be in a state of inflammation, as the surgical proceeding under such circumstances would assuredly greatly increase the inflammatory dispo-

* It is also recommended as a *dernier resort* in the tinnitus aurium of aged persons; in some instances it has afforded marked relief in one or both ears.

† Saunders on the Ear, p. 44.

sition, and might induce a state of considerable danger, even to the induction of caries, and fatal meningitis. Hæmorrhage again might occur during the performance of this operation, slight as it may seem, and might fill up the cavity of the tympanum. Should such be the case, unless the effused blood drain off through the aperture—and to facilitate its discharge, the patient should lie on that side—it might become coagulated and even organised, and then it would offer a serious mechanical obstacle to the auditive function.

To obviate the great tendency of this membrane to reunion when wounded, it has been proposed, after the operation has been performed, to pass occasionally through the lips of the wound, a small silver probe, coated at the end with nitrate of silver, until a fistulous opening be established. The coating the silver probe with the caustic is easily effected by dipping it a few times in the salt previously liquefied.

CHAPTER V.

DISEASES OF THE LABYRINTH.

PERHAPS there is no organised structure in the human body which is totally exempt from the incursions of disease; but there are some parts which are much less liable than others to be thus affected. The diseases of the labyrinth are certainly few in number, and of these little is actually known, except in so far as they occur by extension of inflammation from the middle ear. And even if we could easily diagnose existing disease in the labyrinth, it would be quite out of the reach of surgical appliances, and could only be treated medically on the common principles of our art.

There is however one very common form of deafness, called *nervous deafness*, which has been supposed to depend

upon "paralysis" of the portio mollis of the seventh pair, or upon some other inexplicable lesion of the delicate branches which traverse the labyrinth. This species of deafness consequently, being generally attributed to something wrong within the labyrinth, naturally comes under discussion in this section.

NERVOUS DEAFNESS.

This term is too commonly applied without sufficient discrimination to cases of deafness, the cause of which is unknown, but which further investigation has shown to be dependent upon one or more of the morbid conditions noticed in the preceding portion of this work. Nevertheless there are cases in which, as in amaurosis or nervous blindness, there exists deafness in consequence of some lesion of the nervous system, whether of the nervous tissue expanded in the labyrinth, or the origin or course of the seventh pair, or in the brain itself.

Nervous deafness may be either *senile*, as a consequence of general decay, or *morbid*, as the result of some diseased action.

Of *senile* deafness, arising from the insensibility which occurs in the nervous tissue in advanced years, there is little to be said, except that care should be taken not to confound it with a morbid condition susceptible of relief from treatment, which unhappily is not the case with senile deafness. The difference becomes apparent by inquiring into the history of the case, the age of the patient, by physical examination, &c. And it must be borne in mind not only that not every aged person who is deaf is deaf from decay, but also that senile deafness rarely commences before the individual is considerably advanced in years. If therefore we are consulted by an aged person who has been deaf since the period of youth or middle age, we may at once assume that his case is not one of senile deafness, even though the nervous system may be the seat of disease.

Nervous Deafness arising from Disease or disordered Functions may exist in many degrees, the lowest being marked by no great difficulty in hearing, the highest being that state of absolute deafness which necessarily terminates in dumbness. There may be various causes for all these degrees of deafness; but in truth so large a majority of them arise from simple congestion in the organ of hearing, or in its appendages, or from some inflammatory action of a sub-acute character, the nature and treatment of which have been discussed in the preceding portion of this work, that credit is sometimes gained for the cure of nervous deafness when the case has by no means come under the description given in this section. Yet as the cases of *pure* nervous deafness met with in practice are becoming more and more rare under the advancing light of modern pathology, which discovers causes in the vascular system not formerly recognised, it will be more practically useful to describe the cases *called nervous* with all the symptoms met with in practice, and to show with what degree of success they may be treated on the principles of rational medicine.

Case.—A gentleman, ætat. 41, of studious and sedentary habits, who had been suffering for years from imperfect hearing, requested the author's advice in 1852. An intense headache had continued, without intermission, for a period of three months. It was regarded as nervous or dyspeptic in its nature, and the patient had paid but little heed to it, until one morning on rising from his bed he found himself perfectly deaf, not being able to hear the loudest sound; so he had remained to this time. The pain in the head has frequently assumed a neuralgic character, affecting sometimes the right side of the head only, and then, after a time, the left side. Since he has been perfectly deaf he has been much annoyed by constant noises in both ears, which are perpetually changing their character, sometimes being musical, sometimes distressing and harsh: they are always aggravated in damp and moist weather. There is no appearance of disease either in the meatus or membrana tympani. The Eustachian tubes are both pervious, and

the throat presents a perfectly healthy appearance. But his nervous system is evidently broken down by hard intellectual labour pushed beyond his powers. He was advised to remove from the locality in which he resided, which was damp; and aperients and tonics were prescribed, with a salt shower bath daily, and rest for the mind. Under this regimen his health has so far improved that the pains are less intense, more intermittent, and affect only one side of the head. This case may be regarded as a type of the true nervous deafness, being characterised by every phase of disordered sensibility in the nerves of audition, without any manifest lesion of the vascular system. The practical point in this case is to treat the patient constitutionally and generally, and not to interfere with healthy parts, by stimulating the auditory nerve by injecting æther and other medicated vapours into the tympanum through the Eustachian passages. The author has been induced, through the too confident manner in which this plan of treatment had been extolled, to put it into practice in numerous cases, but he regrets to say that it has uniformly proved a failure, and in some cases, where the nervous power appeared to be utterly extinct, it produced a distressing tinnitus, which had not troubled the patient previously. In fact this misapplication of a useful expedient has brought the practice of syringing the Eustachian tube into unmerited obloquy.

Case.—Miss N., ætat. 22, a robust young woman, applied to the author, twelve months since, deaf on both sides to a very considerable extent. She had been deaf for four years, gradually getting worse, but always hearing better in general conversation, or when excited by a noise. The external ears and meatus were sound, the Eustachian tubes pervious, and the general health little affected; but her voice was apt to become husky on changes of weather. She had been under various treatment without improvement, and the Eustachian tubes had been catheterised. *The fact that the patient heard better in a noise, taken in*

connection with the history of the case, and the failure of treatment hitherto, left the author little hope of being able to afford relief. But the huskiness of the voice being a marked symptom, fumigation of the throat by inhaling the vapour of iodine and guaiacum (in the manner already described) was directed night and morning, and a course of mercurial treatment was adopted, and a blister applied occasionally behind the ears. This treatment was continued for nearly three months, when the hearing was perfectly restored on the left side, no improvement becoming apparent on the right. The voice entirely lost its huskiness. In this case both the patient and her friends, as well as the author, were in despair of any approach to recovery; but the use of remedies directed to the only apparent lesion, that of congestion, proved successful. The patient evidently owed her recovery to the fortitude and perseverance with which she followed out, though against hope, the lengthened treatment which was prescribed.

Case.—A middle-aged man, a clerk in a city office, had been rather deaf on both sides from his childhood. Of late he had suffered much from neuralgia of the facial nerves of the left cheek, with an increased impediment in the hearing on that side. Upon examination the ear, the Eustachian tubes, and the throat appeared perfectly healthy and sound. His general health was good. The neuralgic pain was intermittent, generally attacking him towards the evening, and continuing some hours. In the early part of the day he was free from it. He had tried tonics and other remedies, together with change of air, without experiencing any relief after more than twelve months' treatment.

The author merely prescribed a grain of extract of colchicum, and two grains of rhubarb daily for a week, with the application of croton oil behind the ear and over the face, which produced severe irritation in the skin. In about three weeks' time he had entirely lost the neuralgic pain, but the hearing was only so far improved that he could hear as well on the left side as before the attack. In this case it is possible that the deafness and the neuralgia

might have depended upon some common cause, and that the former as well as the latter might have been removed, had the early symptoms been investigated and treated with perseverance.

Cases of nervous deafness with every sort of complication are so numerous that it is not necessary to weary the reader with further allusion to them. The above afford good illustrations of the great variety of symptoms which attend them, and show,—first, the importance of inquiring fully into the *whole* case, including the constitutional and local conditions; secondly, they indicate that no case should be abandoned as hopeless, simply because the structures being apparently sound it is not easy to account for the deafness. In relation to these cases the author fully agrees with Mr. Saunders in the following important suggestions: he says, “Confirmed nervous deafness is, without doubt, hopeless; but I know not, *a priori*, how to determine when attempts are vain. This does not altogether depend on the time, but the degree of mischief done to the organ; and the period at which it becomes incurable must be various. My object is to direct the attention of the practitioner to the commencement of this species of deafness. When early application is made, it behoves him to take the case seriously in hand, for no time is to be lost, and active means in the beginning will often succeed.”*

Whilst on this subject, the author feels bound to mention a form of deafness to which women are liable at the cessation of menstruation, as described by Dr. Tilt, in his “*Elements of Health and Female Hygiene*.” Its occurrence is not dependent on any structural alteration in the organ of hearing. It may be increased by fulness of the cerebral vessels, but the deafness does not depend on this cause, as it is observable in those who present no sign of cerebral congestion. This deafness occurs in women who have never suffered from rheumatism, and can only be explained by taking into consideration the peculiar condition of the nervous system at the change of life. The functions of the

* Saunders on the Ear, p. 51.

nervous system are then frequently perturbed. There is great irritability, loss of power of self-control, loss of memory, and as these symptoms are sometimes accompanied by dimness of vision, it is not surprising that there should be deafness in other cases. Deafness is then also accompanied by headache or a sensation of heaviness; it may attack one or both ears, and it generally admits of being soon cured, when treated by cooling purgatives and sedatives, such as camphor and hyoscyamus. Dr. Tilt, who has drawn attention to this form of deafness, has also sometimes met with it, accompanied by similar nervous symptoms, in young women at the period of the first menstruation. This shows how strongly the nervous system is influenced by the organs of reproduction; but for further details the writer must refer the reader to Dr. Tilt's admirable work on Female Hygiene.*

CHAPTER VI.

NEURALGIA, WITH DEAFNESS.

CLOSELY allied to nervous deafness, and forming indeed one of its frequent complications, is neuralgia of the fifth and seventh pairs of nerves. The case last quoted is an instance, but the subject is sufficiently important to deserve special comment, for as, on the one hand, there is not in the entire circle of medical nosology, a class of diseases respecting which the medical practitioner finds more difficulty in tracing the proximate cause to some determinate seat; so, on the other, of all the disorders to which the nervous system is liable, there are few more afflicting than these painful affections. The sufferers are generally more or less incapacitated for any permanent exertion or employ-

* "*Elements of Health and Principles of Female Hygiene.*"—Bohn.

ment through the intense pain, and the general debility which is thus induced ; and also through the consequences which result from the action of the powerful narcotics so often had recourse to, to deaden the severity of the agony, which are in many cases urgently called for by the very intensity of the pain : thus both the disease and its treatment tend greatly to impair the powers of mind and body.

Although all this affords a strong reason for a thorough investigation into the causes, origin, and nature of these neuralgic affections, nevertheless it is a painful fact that there are few diseases which are so little understood. Opportunities for examining into the pathological changes that may have occurred by means of *post-mortem* investigations are of rare occurrence, and when they are met with, the alterations in the structure of the nerves themselves are not generally of a nature to be cognisable by our senses. The microscope may in future render great assistance on this point, but without its aid little can be effected, for the human eye is not able to distinguish the minute changes in the tubes composing the structure of a diseased nerve. Tumors and even osseous growths have certainly been discovered pressing on the nerve that has been the seat of the excruciating agony of *tic-douloureux*, and some other changes in the vicinal structures have been observed, but the true morbid anatomy of the nervous system offers, even in the present day, a wide field for discovery and speculation.

The pain in neuralgia has in many cases been so entirely confined to one nerve, and the disease has been attended with so little apparent disorder of the system generally, as to have led to the belief that it may be regarded as a strictly local malady. Yet, on the other hand, seeing that an operative procedure has most frequently failed in affording permanent relief, the disease generally returning after a longer or a shorter interval of quiet, the conclusion that it is truly constitutional, or dependent on constitutional causes, has often seemed irresistible.

Some writers have even gone so far as to say that neuralgia is neither more nor less than rheumatism of a nerve or of its neurilemma. The effusion into the fibrous sheath, the result of the inflammatory action, causes the pain, by inducing pressure on the structure of the nerve itself; it has even been said that when *tic-douloureux* shows itself in a person of a rheumatic temperament, it alternates with the rheumatic pain in the fibrous tissues. It has been observed by the erudite Siebold, and by Dubois, that, when prosecuting their investigations into the nature and causes of neuroma, they rarely, if ever, failed to trace the cases to the influence of the rheumatic diathesis. At all events, the patients had been more or less subject to rheumatism in one or other of its forms, prior to suffering from neuralgia.

Without admitting the universality of this condition in neuralgia, the author so far agrees with these views as to believe it to be a very common case. When neuralgia and deafness have been both present, he has seldom failed to trace some symptoms of rheumatism or gout; and in fact no treatment has generally proved more successful than that which is founded on the theory of a rheumatic affection of the neurilemma, or of the nerve itself. It will therefore be well for the practitioner, while investigating the source of the pain, to bear in mind this very frequent complication.

The symptoms of rheumatic neuralgia are heat, pain, and tenderness of the surface, along the course of a particular nerve. There is generally, if not invariably, a *constant, dull, aching pain*, aggravated at intervals; but not the violent thrilling, plunging agony, increased by the least shake of the patient or touch of the surface, as in the other variety. Rheumatism of the nerves is frequently periodical, the attacks coming on at certain times of the day or night. Sometimes a regular paroxysm is experienced about six in the evening, although more often the fits are irregular in their accession. Its origin may often be traced to exposure to cold and wet, but it is liable to in-

in severity from a variety of causes—external, for example. Rheumatism in some other parts of the body is generally an attendant or antecedent. This is or rheumatic neuralgia may be distinguished from true *tic-douloureux* by its *history*; by its *origin* (although this is no great criterion); by the *difference* in the character of the *pain*; and by there being more *heat* of the *surface*, and *rheumatism* of other parts. A more mode of distinction may be drawn from the effects of *medicines*, especially of those which have been already shown to exert a curative or palliative influence in general rheumatism.

Treatment of rheumatic neuralgia resolves itself into treatment of rheumatism; but its complication with neuralgia generally requires the application of some local treatment to the face and behind the ear, such as castor oil, blisters, cantharides, &c. The author is sorry to add, from his experience in the use of galvanism and magnetic treatment, that it has not been at all confirmatory in these cases, although in a high position which modern eulogy has conferred on it. All that they are found to effect in rheumatism is a temporary and very slight benefit, and that in a small proportion of cases.

But the remedies have however proved singularly beneficial in some cases of neuralgia, with what is called *partial paralysis of the facial nerve*, complicated with deafness. The author is anxious that this class of cases should be misunderstood, inasmuch as they have not, as is often supposed, a cerebral origin, but result from external influences, such as cold, miasma, or accidental pressure on the face from glandular or other tumours; and he is inclined to believe that it will account for many cases of paralysis of the face, which are sometimes mistaken for results of more deeply-seated mischief in the brain, the treatment of which also is so obviously different, that the mention of it in this section appears to be necessary. A case related by Mr. Shaw in the "Medico-Chirurgi-

cal Transactions" may be regarded as a good illustration of this.

A man seized with a severe pain under his ear in a short time became so delirious, and his face so distorted, that the people in whose house he lodged, supposing him to be mad from brain fever, carried him to the parish workhouse. There he lay until his friends discovered him, and brought him to the hospital. It was then found that the frenzy which had led the people of the lodging-house to suppose that he was mad, was only a high delirium in consequence of a severe attack of *Cynanche parotidea*; indeed the inflammation had run so high that an abscess formed, and burst under the ear; when the swelling subsided, the degree of paralysis was easily noted: the delirium and the paralysis of the face naturally led the gentleman who first saw this patient to suppose that the symptoms were caused by an affection of the brain. Luckily, the treatment generally adopted in cases of phrenitis was that best adapted for the particular affection which had caused both the delirium and the paralysis.

In the following case, which ultimately came under the author's care, the error was practically important:—

Miss T. was seized with rheumatism of the arms and considerable pain in the muscles of the neck; the seizure was attributed to sitting at the window during an evening in the autumn; her face, the following morning, was observed to be distorted, and she complained also of considerable pain in the ear. She was subjected to a severe form of treatment, *the paralysis being supposed to indicate disease of the brain*. This lady's recovery was retarded, and the paralysis all but made permanent, by the severity of the treatment, although the history of the case shows the seizure to have had a local origin only. The character of the pain and the subsequent discharge from the ear, the muscular portion of the neck participating generally in the seizure, strongly point, in such cases, to a peripheral origin, and show that much of the severity of the treatment *might have been spared*.

In some of these cases it would appear that the seventh nerve is not affected at all, but the motor branch of the fifth. When the muscles of the face alone are paralysed, it happens in a great majority of instances that the nervous function is interrupted in that part of the portio dura which lies encased in the bony canal, or in the more exposed part which issues in front of the ear; this particular form of palsy is in general unattended with any danger to life.

ARTIFICIAL MEMBRANA TYMPANI.

Although, when the Eustachian tube is closed, some relief to deafness may often be obtained from perforating the membrana tympani, yet a large opening in this membrane, resulting from previous abscess or ulceration, not only renders the patient liable to attacks of otorrhœa more or less permanent, but also interferes considerably with the function of hearing. This condition of the parts is not very creditable to the art and science of surgery, inasmuch as few attempts have hitherto been made to prevent, and still fewer perhaps to cure it. It has been shown, in a former part of this work, that a perforate condition of this membrane *generally* results from inflammation and abscess of the tympanum in severe cases of scarlet fever, the abscess being allowed to burst and the membrane to ulcerate without an effort on the part of the surgeon to prevent so disastrous a catastrophe. A case has also been related (page 101) in which it is shown how easily the contents of the abscess may be discharged by a timely puncture of the membrane, without permanent damage to the membrane itself, or the slightest subsequent deafness resulting. By this simple operation, not only is the membrane preserved, but the ossicula remain intact, and are not allowed to exfoliate or slough away as they too commonly do, together with other important structures, when the disease is left to take its course unchecked. As regards the healing of an aperture in the membrane of the tympanum of long dura-

tion, but few attempts have yet been made with any degree of systematic perseverance; and indeed if such attempts were successful, little advantage could be expected from restoring the integrity of the membrane in those cases where *all* the ossicula have been destroyed; but if the stapes alone be entire and attached to its membrane, the case is not hopeless, as the author has found even an artificial membrane of great service under such circumstances. It is needless however to say how much better it would be, if possible to restore the natural membrane than to have recourse to artificial means.

In cases of ulcerated or perforate *membrana tympani*, with occasional or constant otorrhœa, there are three indications of treatment:—

1. *Constitutional Treatment*.—This is too much neglected or overlooked, and the resources of surgery often fail in consequence. The subjects are often strumous, the glandular system is frequently affected, and an unhealthy condition of the mucous membrane of the tympanum is usually the source of the discharge. This should be corrected by tonics or alteratives, or by both as the case may require.
2. Care should be taken that the matter is freely discharged, and if the opening be very small and of long standing, there is reason to suspect there is a sort of fistulous cavity between the layers of the membrane, in which case the aperture should be enlarged.
3. The parts being well cleansed by tepid injections, the nitrate of silver, finely pointed, should be carefully applied in substance, or a strong solution with a camel's hair brush, to the edges of the membrane twice or thrice a week. This requires some delicacy of manipulation lest too large a surface should be touched; success will greatly depend upon the adroitness with which the remedy is applied all over the morbid surface, without infringing on the healthy parts. Under this treatment the discharge will gradually subside, and even a large aperture will sometimes heal and close completely.

Failing these attempts, the next consideration is to provide something which will in some degree compensate for

the loss of the membrane by closing the tympanum, leaving the meatus externus free and unclogged.

Several surgeons (Itard, Deleau, and Tod,) have proposed different methods for closing the perforation of the membrane of the tympanum by mechanical means ; Itard introduces a portion of cotton wool to the bottom of the meatus ; Deleau, a piece of wood or the central part of an onion ; Mr. Tod, a little lint ; Mr. Yearsley, cotton wool in a moistened state (*hydrated cotton*, as he terms it); and Mr. Toynbee, a piece of vulcanised India rubber or gutta percha, to imitate as nearly as possible the natural membrane. Each of these contrivances is useful in different cases, but certainly not one of them has claims to indiscriminate adoption. When there is profuse otorrhœa which cannot be cured, according to the author's experience moist cotton wool has been found to answer best. The application of cotton is useful when the meatus is small, the aperture in the membrane large, and the membrane not utterly destroyed, but it requires the hand of the surgeon to apply it, so that the aperture in the membrane shall be closed, and at the same time the patency of the meatus preserved. When the meatus is large and roomy, and there is little or no discharge, Mr. Toynbee's apparatus has sometimes answered exceedingly well ; it is but right however to state that in some cases no benefit is to be derived from any of these artificial means.* What the moistened cotton in some cases will effect is quite marvellous—almost instantaneous restoration to comfortable hearing ; but in other instances it does not succeed so well, or even at all. Much depends upon the exactness with which it is made to fill the aperture without pressing against the inner wall of the tympanum, and without blocking up the meatus or arresting the vibrations. Some patients learn to apply it themselves, directed

* The author has recently been informed, on the authority of his friend Dr. Wilkes, U.S., that these expedients have met with but little success in Paris among the surgeons engaged in this department of surgery, although a very extensive trial of them has been made.

by their own sensations; and they often succeed better than the surgeon.

It is to be hoped the time will come when these ingenious devices will no longer be needed, and when by the skilful interference of the surgeon the occurrence of these sources of deafness will be prevented to a great extent, or if not prevented, that the perforation will be removed by early and judicious treatment.

Dr. Healy, one of the surgeons to the Cuffe Street Infirmary, Dublin, has lately published, in the *Dublin Hospital Gazette*, an interesting case of rupture of the membrane of the tympanum, the result of an injury, the particulars of which somewhat bear upon and illustrate the writer's views. The patient was a healthy young man, who, while playing at snowball last January, received a violent blow on the left mastoid process, by which he was stunned for a while, and lost the hearing of that ear. He complained however of a noise, as if something was rushing through the organ to his head; there was a constant buzzing, rushing noise, nearly amounting to torture, which nothing relieved. The examination of the meatus, and the symptoms he presented, clearly demonstrated that a rupture of the tympanal membrane had taken place. Slight otorrhœa set in at the end of a fortnight, and a week after, no attempt at union having taken place, Toynbee's artificial membrane was introduced, and appeared to fit: it evidently immediately lengthened the hearing distance, and also caused the rushing noise to cease, but it soon induced an increase in the otorrheal discharge, with throbbing, &c., so that it was of necessity removed, and cathartics given, with poultices locally applied, until the inflammation was somewhat subdued, when the gutta-percha membrane was re-introduced, and at the date of the report had been worn for some time with apparent comfort and advantage.

Thus far then the report of the case in the *Dublin Hospital Gazette* would seem to show that the artificial membrane made of gutta percha, as recommended by Mr. Toynbee, suited this case, was applied at the proper time, and

1 the patient every service that could be expected but the author met Dr. Tyler, Dr. Healy's colleague, ently, and learned from him that after the details case had been published, inflammation was set up the meatus, and there was profuse otorrhœa. The as consequently again removed; the inflammatory and discharge were checked and arrested by appropriate phlogistic treatment, and then the edges of the in the membrane were brushed over from time to th a solution of nitrate of silver, the result being e rupture closed, the discharge quite ceased, and ient got well, not needing any plug or artificial ne. Such an occurrence has been observed by the on more than one occasion, and he therefore urges ution in the use of the artificial tympanum.

ase just detailed is by no means peculiar. The arti- mpanum, serviceable as it may be in old and obsti- es, where the aperture in the membrane has long ulous and its edges have become callous, is by no o well adapted to remedy the consequences of an y in the membrane when recent, whether it be y a direct wound, by concussion, or by ulceration. evious part of this work the great tendency of the ne when wounded to unite by what is termed the tention" has been clearly shown, and great stress n it, especially with respect to the operation for the l perforation of the membrane. In cases then of ajuries or ulcers, this tendency should be in some elied upon, and excited by appropriate local treat- A certain amount of inflammation, not enough to uppuration, but sufficient to forbid the presence of 1 body, is requisite to enable the wounded edges to d unite; if this is not in existence, it may be in- s in Dr. Healy's case, and as previously recom- by brushing over the edges of the wound or ulcer timulating solution of nitrate of silver, care being keep the passage clean, and the membrane itself as possible, its vibrations being restrained by pre-

serving absolute silence, if it may be. As in injuries and inflammations of the eye, the exposure to light is to be avoided as much as possible; so again in congener affections and injuries of the ear, silence is imperatively necessary, to prevent those movements of the membrane which, in the case under notice, might otherwise impede the union of the divided part. By these means, and when requisite, by the application of the solution of the nitrate of silver, repeated occasionally as it may be required, the wound will soon close, and the ulcer will gradually contract and heal. It follows therefore that the artificial tympanum should not be employed until the inflammatory action has long subsided, the ulceration become chronic, and its edges quite callous.

CHAPTER VII.

DUMBNESS IN CONNECTION WITH DEAFNESS.

DUMBNESS may exist without deafness, as it may be the consequence of some lesion or defect in the organ of speech; but absolute deafness, if it be congenital, or established in early childhood, cannot exist without rendering the sufferer dumb; mutism in this case being simply the consequence of an utter ignorance of language; at the same time, a want of the power of speech may coëxist with deafness. No condition is more melancholy or more to be deplored than this; if a child once learn to talk, and then becoming deaf, gradually forgets, one by one, the words by which it was wont to convey its ideas, until at length every recollection of language is obliterated from the memory, its case is indeed affecting in the extreme, and presents another strong reason why disease of the ear should not be neglected in childhood or even in infancy. If anything

can merit an assiduous and pains-taking investigation into the seat and origin of disease, it is the helpless and forlorn condition of a fellow creature deprived at once of the privilege of speech and of social intercourse, and consequently cut off from those means of instruction and discipline which are essential to the development of both the intellectual and the moral faculties of his nature. A human being under such privation of all that is noble and great in his nature, becomes necessarily animalised and degraded in spite of every effort directed towards his intellectual and moral culture. No motives can be presented to him which can either tend to the cultivation of virtuous sentiments, or promote aspirations towards a nobler destiny than the present.

The records of recovery from deaf-mutism are indeed anything but encouraging; although several individual instances of such a partial recovery of the hearing as admitted of oral instruction are related by Valleroux and others. Most of these cases were among those in which the throat was affected, probably from scrofulous inflammation with obstruction of the Eustachian tube, and yielded to medical treatment. The experience of the author, painful as it is in regard to adults who are deaf and dumb, is nevertheless very encouraging in regard to the promise of success which attends the management of that total deafness in infancy, which, if left to take its course, will assuredly terminate in mutism.

The deafness which deprives the sufferer of the faculty of speech may be congenital, or it may be the result of the visitation of disease in infancy or childhood. It is not absolutely certain that *congenital* deafness is incurable. The child may have contracted from its parents specific disease, curable, or at least remediable under a special treatment; but even if it were certain that congenital deafness is without remedy, still the fact would supply no excuse either to the parent or to the surgeon for neglecting infantine deafness, inasmuch as it can never be proved to be congenital. The proofs that a new-born

infant is deaf are exceedingly equivocal, and can never be substantiated till it is too late to be of the slightest diagnostic value, dissection offering the only valid proof, and even this fails in many cases. "That a total deafness may exist," says Mr. Saunders, "without any defect in the mechanism of the exterior parts of the ear, without any defect in the membranous structure on which the nerve is expanded, in the water which it contains, or in the nerve itself, at least as far as can be traced by the eye, I have myself ascertained by dissection."

To show the difficulty of ascertaining the existence of deafness in a young child, we have only to try our hand on any babe less than three or four months old. The sight is much more early and easily tested than the hearing, and for all the practical purposes of this essay, it will be proper and almost necessary to assume that the child is born capable of hearing, and that the organism is perfect. If, as the child grows, the organs of hearing fail to exercise their office, a rigid scrutiny should then be instituted into the cause of the infirmity, which may possibly be detected and remedied.

The extent of the evil we propose to investigate, and the consequent necessity of using our best efforts to avert it, is too plainly demonstrated in the statistics of this infirmity. The census taken in 1841 shows that the proportion of deaf-mutes in England at that time was 1 in 1600; if the proportion still remain the same, there are now about 14,000 deaf and dumb persons in England.

The *causes of deaf-mutism* may be various. If the deafness arise from original organic defect or malformation,* of course there is nothing to be done; but this condition is rare, and it should never be assumed to exist. It has been clearly ascertained that the most common cause is a strumous and delicate habit of body, generally hereditary; the thickened and follicular condition of the mucous membrane

* Among the congenital alterations of structure occasioning deafness may be noticed the total absence of the external ear and meatus, malformations of the semi-circular canals, or absence of the labyrinth altogether, &c.

f the throat described in a former chapter is, in such cases, an ordinary complication. Next to scrofula, certainly in the author's experience, *the cerebral irritation excited by dentition* is an exceedingly common cause of both deafness and dumbness; and he has very frequently been able to trace their commencement to convulsions produced by cutting the first molar teeth.

Deaf-dumbness may be the consequence of fever; the same cause has been known to produce dumbness without absolute deafness. A remarkable case of this kind is related by Dr. Foley, of Kilrush, according to the following account of the case given by Mr. Wilde:*

"A boy, aged 13, had a bad attack of typhus in 1839, and after a severe struggle, recovered, but with paralysis of the right side and total loss of the power of speech. It was however believed, that he was not deaf, as he could still hum tunes. He soon recovered from the paralysis, but remained dumb for eight years, when my attention was directed to the peculiarities of his case, while engaged in making inquiries into the circumstances of the deaf and dumb under the present Census Commission. I communicated with Dr. Foley, who kindly afforded me many interesting particulars of the case, and also published the following additional account of it in one of the periodicals:—'During recent inquiries made about the case, I find that the patient continued completely dumb for the space of eight years, after which he and every member of his family were seized with typhus fever. Towards the termination of the disease he was observed to articulate one or two short words at different times. As convalescence progressed, pains were taken to teach him a few more, and by very slow degrees, indeed, he was gradually brought on, so that now, at the end of three years, he can speak very distinctly, but at times so rapidly as to cause him great embarrassment. The intensity of the disease must have been much less in the last attack than in the former, as

* "Practical Observations on Aural Surgery," p. 342.

in the first he was quite unconscious nearly from the commencement ; while in the latter, he has stated to me, that he never lost his recollection. He has a perfect memory of every circumstance since his fever in 1839 ; was well aware of the privation under which he laboured, and therefore shunned intercourse with all except members of his own family. He understood very well the jeers and observations made by those thoughtless young persons among whom he was often obliged to be ; galling as they were to his feelings, he had no way to defend himself, and could not convey that he comprehended every word as well as any of them. I questioned him on different occurrences that took place since he had been my patient in 1839, and found that his memory on and acquaintance with them was quite accurate ; so that I have no doubt of the correctness of his comprehension during the eight years of his dumbness. He told me that, since the original disease, he felt a "weakness" in the right side of his body that never prevented his power of moving, but yet made him feel "uncomfortable ;" that, as the power of speech returned, the "weakness" was diminishing, so that now he scarcely feels it. I stated in the original Report, that he exhibited, during the fever, a very severe and well-marked paralysis of the right side, including every part from the eye to the toes ; that on the nineteenth day it had nearly disappeared, and he was soon after able "to run about." There seems to be no doubt that the leading feature was meningeal engorgement, in the head at all events, and probably continued into the spinal canal. I think it probable that striae of that congestion remained at the base of the skull, compressing some of the filaments composing the roots of the glosso-pharyngeal portion of the eighth nerve ; as also of the ninth on the same side.'

"In the same paper Dr. Foley has related a case of post-febrile deafness, in a boy about eight years old, and, as the defect of hearing is complete, he is gradually losing speech, and can now only pronounce a few words. I do not know the state of the ear in either case.

"Sir Charles Bell has related a most interesting case of disease of the ear and loss of speech, which bears some affinity to that recorded by Dr. Foley, and of which the following is an abstract, nearly in the words of the narrator. A boy, aged 10, was seized with obstinate pain in his left ear, which, extending to his head, face, and teeth, gave him no rest day or night; he also then lost the sight of his right eye. He recovered from this attack apparently by a considerable discharge of pus from the ear, attended with intense pain, delirium, and convulsions. Some time afterwards he had a second similar attack, remaining insensible for half an hour, and when he awoke to consciousness, 'he was speechless.' When brought under the care of Sir Charles Bell, he had a discharge from his ear, and was quite deaf, and the left arm was paralysed; he could masticate and swallow with ease, and also protrude the tongue and turn it from side to side; but he was utterly unable to pronounce words. The consent of action between the chest, larynx, and mouth, seemed to be lost shortly after the foregoing note of his case. It was then reported that he was able to whistle, but, says the author, 'on witnessing this attempt, we find that he makes a faint noise by drawing in his breath; and that, in fact, he cannot whistle.' In this state he remained for six weeks longer, when we read that, 'his efforts confirm the former statement, that he is incapable of putting the tongue and larynx into coöperation in speech. The mouth is shut, the tongue and larynx perfectly still, and he makes a noise by impelling the air against the posterior nares.' Nine months after the time when he lost his speech, he recovered it in the following manner, as related by his mother:—'Three mornings ago he recovered his hearing and his power of speech at the same time. She had just been observing that he could not be very ill, since he was tumbling about, and throwing his heels over his head in bed. Soon after, his sister came running down stairs, saying, that her brother could speak, and a quantity of matter had come from his head into his mouth. *From that moment he could hear, and with a pain-*

ful degree of acuteness, the boy saying that the air rushed through his head. She describes his voice, too, as at first unnatural, and as if he spoke with difficulty; a circumstance which cannot surprise us, when we recollect that it is nine months since he could speak a word.' Bell has appended the following remarks to this curious case. 'There appears to have been an abscess, originally produced by disease of the temporal bone, and affecting the nerves at the base of the brain, first affecting the fifth nerve, and then spreading its influence to the seventh and ninth. If the disease had produced its influence mechanically, and by pressure, there would have been no obscurity, and one side only would have been affected; but I imagine that the inflammation had disturbed the operations of the nerves, without altogether destroying their influence, deranging, for instance, the fine associations necessary to speech, without arresting the action of the muscles of the tongue. It is remarkable, that the bursting out of matter, probably from the Eustachian tube, had such an instantaneous and simultaneous effect in restoring both hearing and speech.'*

It occasionally happens that hearing occurs spontaneously in persons who have been previously deaf and dumb, and I think it possible that, in these cases, the Eustachian tube may have been impervious; and from some circumstances, such as cold, subacute inflammation is set up, and the membrana tympani ulcerates; the same effect being produced by nature, as has been so ingeniously performed by art.

Cases.—*The Mémoires de l'Académie des Sciences* for the year 1703, present an example of this kind, which happened to a young man at Chartres, 24 years old, who, to the great astonishment of all the town, began speaking all of a sudden. He explained that, three or four months before, he had heard the sound of bells, and had been very much surprised with this new and unknown sensation.

* "'The Nervous System of the Human Body.' By Charles Bell, F.R.S. London, 1830, p. cxviii. See also Dr. Abercrombie's cases in the *Edinburgh Medical and Surgical Journal* for July, 1818."

There was afterwards a sort of water that passed out of his left ear, and he heard perfectly with both his ears. He continued for three or four months hearing without saying anything of it, repeating to himself the words that he heard, exercising himself in pronunciation, and in the ideas attached to words. At last he thought himself in a state to break silence, and he maintained that he could speak, though it was still but very imperfectly.*

"A young man, born at Nantes, deaf and dumb, when 28 years of age, had perfectly gained his hearing and spoke well, although no remedies had been adopted."†

All the causes of deaf-dumbness are not as yet well known; the researches in pathological anatomy recently made by Itard, Kramer, and others, have shown that the same changes as in cases of acquired deafness are sometimes met with in the deaf-dumb. It seems that there may be obstruction of the Eustachian tube, of the cavity of the tympanum, destruction of the small bones, and perforation of the membrana tympani. Itard met, in some cases, with vegetations, concretions, and a substance resembling chalk, in the cavity of the tympanum. In another case the stapes was absent. But if the cause of congenital deafness be appreciable in some cases, still there are many where it is not so; and we are forced to admit the probable existence of abnormal states of the labyrinth, of the acoustic nerve, and of the brain itself, which escape and baffle all our most minute investigations, and which remain inaccessible to all the appliances of therapeutics. Still we may state that in some cases congenital defects and malformations in the structure of the semicircular canals and cochlea are to be met with, quite sufficient to account for the occurrence of permanent deafness; in some instances there has been found a solution of continuity in the semicircular canals; in others, in lieu of the water they should contain, they are blocked up with a cheesy

* Magendie's Physiology, translated by Milligan.

† Williams on the Ear.

matter, so that the vibrations of sound cannot be transmitted to the brain ; in others, again, one or more of the canals may be malformed or absent ; a similar state of the parts may obtain with the cochlea. In at least one instance the author has found the mastoid process quite solid, like a piece of ivory, instead of being filled with cellular tissue.

The mode in which dumbness results from deafness is very intelligible. We know that the child learns to speak by reproducing the sounds which he hears daily ; the intelligence also is favourably disposed to this process in the early stages of life. If then the ear do not seize the sounds of the speaker, the mouth cannot reproduce them ; this fact affords the simple and obvious reason why dumbness necessarily follows deafness ; if at a more advanced age we happen to restore by any means the faculty of hearing, entirely or in part, the intelligence is no longer so favourably disposed to the repetition of speech ; thus rendering it so difficult to educate the dumb even after their hearing faculty has been restored or improved.

Müller, in his physiology, thus connects speech with the faculty of hearing :—"The formations of perfect vocal tones presupposes the possession of the sense of hearing. It is only with the greatest labour that individuals born deaf can learn to utter a series of harsh sounds. The deaf and dumb owe their want of speech to their deafness ; they can by great labour learn the movements of articulation by means of their sight ; but their speech is never more than a series of harsh sounds, not adapted for human society, for they want the sense of hearing to regulate their articulation. There is no nearer medium of connection between the faculties of speech and hearing than the brain, and it is not evident how nervous communications could be of use to either organ. The connection of the facial nerve with the lingual branch of the fifth can have no influence on speech or hearing ; for the facial nerve has nothing to do with hearing : the lingual branch of the *fifth* nothing to do with speech."

Hence then the deaf-dumb person is one who is dumb only because he is deaf; or, in other words, he is incapable of using language, the sounds of which he has never been able to hear, and consequently never could attempt. The senses of sight and hearing are no doubt the two most important channels by which knowledge is acquired—a deprivation of the latter would seem perhaps on a cursory view to be a less fatal impediment to the acquisition of information, than the former; but when it is considered that a want of the sense of hearing involves with it the loss of the principal medium of mental intercourse, language, it becomes evident that the bar to intellectual improvement is by such a deprivation doubly augmented. Hence it was deemed utterly hopeless to attempt any relief for the deaf and dumb, as being persons cut off by nature from the acquisition of knowledge; hence they have been abandoned to a state of mental destitution, as though no remedy was left, it being considered, that

“T’ instruct the deaf no art could ever reach,
No care improve them, and no wisdom teach.”

The predisposing causes of deaf-dumbness have rarely been investigated with much attention or success, but a most instructive essay on this subject, so full of interest to the philanthropist and political economist, is to be found in the Appendix to Wilde’s “Aural Surgery.” Having shown that there is but little foundation for the “popular opinion” (more prevalent probably in Ireland than in England) that fright experienced by the pregnant mother is the cause of deaf-dumbness in her offspring, he proceeds to show that “Among the predisposing causes of mutism, the too close consanguinity of parents may be looked upon as paramount. Many conjectures have been offered upon this subject, but the question has been set at rest by the results of the Irish census. From the delicacy attending this inquiry, the answers must be, to a certain degree, deficient; still, out of the deaf and dumb returns from all causes, we

procured the particulars of 154 instances in which the parents were related in the degrees of first, second, or third cousins. The result of these intermarriages was 100 cases—86 congenital, and 6 acquired—of one mute in a family; 4 of these were dumb only; and 4 were dumb and idiotic. In 34 families, where the parents were related, two children were deaf and dumb, in only one instance of which the disease occurred after birth. There were fourteen instances where three mutes were born in families so circumstanced; and three where four in each family were deaf and dumb. The parents were also closely related in instances where six and seven in a family were similarly afflicted."

Many interesting statistical facts are added which tend to show that the disease prevails in large families and in cases of twins; among whom it often occurred that both the children were mute. The following observations are interesting:—

"It has been asserted that deaf mutism is principally an infirmity of the poor, the result of their unhealthy dwellings, bad and insufficient food, impure air, want of clothing, and those other causes which elicit scrofulous manifestations; but if this were the case we should find more mutes in the civic than the rural districts, whereas the contrary obtains. It has also been stated, that mutes are inferior in intellectual endowment, owing to imperfect cerebral development, but, except in those cases complicated with other congenital or acquired defects, it will be found that the deaf-mute—when we take into account his deprivation of one of the chief inlets of knowledge—shows as great mental aptitude as other persons of the same class in society. The same arrests of development and malformations of the cerebro-spinal system which, when confined to the organ of hearing, produce deafness, give rise when they extend to the brain, to idiocy, epilepsy, and paralysis. Hence the large amount of 362 cases, idiotic or paralytic, or 1 in 12·39 of the entire 4485 returned; while the general proportion of the idiotic to the population of

Ireland is 1 in 1460. Many of the 362 specified above were also defective in stature, or otherwise deformed.

"From similar circumstances we find a greater proportion of insane among mutes than among the population at large, in which latter there is but 1 lunatic in 1312, whereas there were, at the time of taking the census, 32 insane deaf and dumb persons, or about 1 in 140 of that class from all causes.

"Even among the born deaf-mutes hearing is not altogether deficient. Itard makes the following division upon this subject: first, those that can hear the human voice as sounds, but are unable to distinguish words, amounting to about one-tenth of the whole; secondly, those who can distinguish loud noises, such as clapping the hands, the ringing of bells, thunder, cannon firing, &c., who amount to five-tenths; and thirdly, those who are completely deaf, numbering about four-tenths of the whole. The deaf and dumb are however particularly sensitive to vibration, and this is often mistaken for hearing. Thus, in the Institution at Paris, the movements of the pupils are regulated by beat of drum; and in the American schools bells are usually employed to call the pupils to school or dinner; it must however be remarked, that notice of their ringing is given by those who are only partially deaf, to the rest. I may here mention an interesting physiological circumstance which I witnessed during one of my visits to the Imperial Institution for the deaf and dumb at Vienna, in 1841. The majority of the pupils were always conscious of the vicinity of a military band, though at some distance off; several of them were sensibly affected by different musical instruments when played in the same room with them, though the performers were placed behind a screen; thus they expressed different sensations when wind or stringed instruments were played; and one boy in particular became sick in his stomach upon the trombone being sounded near him."

The importance of an inquiry into the causes of deafness induced the directors of the institution at Paris to issue

circular letters, containing a series of questions as follows, addressed to the parents of their pupils :—

1. Was the child born deaf, or has he become so since his birth ?

2. In the first case, what circumstances preceded, accompanied, or followed his birth ? In the second, at what age was he found to be deaf ?

3. Since the time of his birth till that when he lost his hearing, has he suffered under any illness, or met with any accident ?

4. Is the loss of hearing to be attributed to this illness or to this accident ?

5. Independent of deafness, has he any other infirmity ?

6. In this case, was this infirmity anterior or posterior to the deafness, and for how long ?

7. Had the child spoken before he lost his hearing ?

8. How many children are there in the family, and among them how many deaf-mutes ?

9. Is the father or mother deaf and dumb, or have they any other disease ?

10. What was the age of the father and mother at the time of the child's birth ?

11. What is their occupation ?

12. Is the residence of the parents in a flat, mountainous, or marshy country ? Is it exposed to humidity or to any other peculiar atmospheric influence ?

Lastly. The parents or the friends of the child are requested to give all the particulars which it is possible to furnish explanatory of the causes of deafness.

The following is a brief notice of the result of this inquiry. Out of 102 children whose parents furnished the required information, 52 were born deaf, 37 became so after birth, and of the remaining 13 no positive information could be obtained. Of the 37 who became deaf after their birth, seven lost their hearing during the first year, thirteen in the second, seven in the third, one in the fourth, five in the fifth, and four in the eighth year of their age. On examining into *the causes* of the deafness of these children, eight cases were

found to arise from violent convulsions during the period of dentition or from fright ; in ten, deafness supervened upon epidemic fevers—cerebral, nervous, scarlet, inflammatory, putrid, or catarrhal ; two cases followed measles, six arose from verminous diseases, one from a deposit of matter under the ear, one from a violent sore throat, one from a fall, one from a cold, and one from strumous ophthalmia ; seven cases of deafness were attributed to virulent diseases, of which the parents could not explain the nature ; and lastly, four children who were not born deaf lost their hearing without its being possible to refer the loss to any illness of serious nature. Of these 102 deaf-mutes, 21 belonged to families in which there are other children afflicted with the same infirmity ; nine families contain each two deaf and dumb children, among two, three, four, five, six, and eight ; seven families have each three deaf-mutes, out of three, four, seven, eight, and twenty-six children ; three families contain each four, out of four, seven, and ten children ; one family has five deaf and dumb children out of eight, and there is one family which out of ten children contains seven deaf-mutes ; with the exception of one brother and one sister who lost their hearing after birth, all these children, belonging to families where there are several deaf-mutes, are afflicted with congenital deafness.

Treatment of the Deaf and Dumb.—The first and most important question in the treatment of deaf-mutism is, did the individual ever hear at all ? If the faculty had once been perfect, it then becomes a case of common deafness excessive in degree, but still susceptible of relief in a certain proportion of cases. If the child were never observed to be at all sensible to sounds, the case is less hopeful, but still not altogether to be abandoned.

When the calamity can be traced to a strumous habit (which becomes the more probable when it proves to be hereditary), there is at all ages sufficient ground of hope that relief may be obtained, to justify at least a long perseverance in an intelligent and judicious plan of treatment ; and we have the more encouragement to hope for success

in these strumous cases, inasmuch as we know that scrofula is the especial disease of childhood and youth, and, as the patient advances in life, its incursions are generally less severe and more under the control of the surgeon. In these cases we gather important indications for treatment by a careful examination of the throat, the tonsils, and the glandular system generally. The mucous linings of the auditory canals should also be examined with care, and the pervious or impervious state of the Eustachian passage should be ascertained. The following case will illustrate this subject. One higher degree of deafness would have produced mutism.

Case.—A farm-labourer's daughter, *ætat.* 16, was brought to the author in the year 1848, so deaf that all attempts at conversation by speech had long been abandoned; though she was not absolutely dumb, her speech was so unintelligible, and her voice so husky, that her utterance was scarcely like that of a human being. She had been deaf from infancy; and from that period to the present she had been subject to a constant otorrheal discharge from both ears. Upon examining the meatus on both sides, the mucous membrane was found so thickened and disorganised as to baffle all attempts at getting a view of the membrana tympani. The mucous lining of the throat, and probably the Eustachian tubes, partook of the same condition; the tonsils were greatly enlarged, and the velum and uvula pendulous and relaxed; the patient, though ruddy, was evidently of a strumous constitution, and had never menstruated. She was brought to the dispensary merely that something might be done to check the discharge, no hopes being entertained by her friends that her hearing could be in the slightest degree amended. The meatus was syringed frequently with astringent injections, and the throat fumed by the inhalation of iodine. She was recommended to avoid exposure to atmospheric changes as much as possible. Her constitutional condition was chiefly attended to. The compound iron mixture, with the compound decoction of aloes, was directed to be taken twice a

day, with a galbanum pill at bedtime, and a mustard poultice to the loins every night. After three months of this treatment the otorrhœa was perfectly suppressed, and the voice had improved, but the hearing remained as it had ever been. Upon examination with the speculum, the meatus was found much cleared, but the ceruminous circle was absent, the membrana tympani entirely wanting, and the stapes could be seen in both tympana. The medical treatment was continued for some months, not without some faint hope of further improvement, inasmuch as the tick of a watch could be distinctly heard at times (though not always), upon bringing it in contact with the teeth or the bony parts about the ear; a proof that the nervous structures of the organ were still intact. At length the catamenia became established, the condition of the throat was restored to a normal appearance, the tumefaction of the tonsils greatly subsided, and, to the surprise of her friends, her hearing, though still imperfect, was sufficiently improved to restore her to her proper position in society, and to enable her to converse without much difficulty. The change in her appearance and habits was striking. She was formerly employed in the farm as a boy, carrying water, taking charge of cattle, and other rough work. Now she is a domesticated young woman, and has become delicate and feminine in her habits and tastes. It is remarkable that the tonsil on the left side still continues considerably enlarged, and yet the hearing on that side is far better than on the other. The Eustachian tubes are both pervious, but the membrane of the tympanum, together with the malleus and incus, is wanting on each side.

This case shows how much may be accomplished in some instances by appealing to the sympathy of distant organs, and rousing the constitution to a more vigorous performance of the normal functions; it also shows that the integrity of the tympanum though necessary to perfect hearing, is by no means essential to that lower degree of audition which is required for the ordinary duties of life.

The treatment of deaf-mutism in its very earliest stages

is attended with a far greater promise of success than when it has been neglected for a number of years. This is particularly the case when the disease commences, either with, or without convulsions, *during the period of dentition*.

Dentition has always been regarded as a critical process, particularly liable to irritate the nervous system, and to excite various forms of functional disturbance, or even to set on foot organic mischief, but it has seldom been regarded as a cause of deafness; whereas in the author's experience it has certainly proved a frequent cause thereof. And indeed analogy throws some light upon this very interesting point. Dr. Robert Taylor has remarked, in a paper which recently appeared in the *Medical Times*, that deposits of lymph in the anterior chamber of the eye, probably from iritis, causing blindness, may arise during dentition quite irrespective of any specific poison, and may be removed by attention to the gums, and by other appropriate treatment. In like manner we may assume that similar mischief may take place in some of the delicate structures of the ear during the process of dentition, causing deafness, temporary or permanent, according as the case is met by prompt and energetic treatment on the one hand, or wholly neglected on the other. And independent of this palpable impediment to perfect hearing, it is clear that whatever causes convulsions may likewise paralyse any part of the nervous system. The following case will show the importance of this subject, and suggest rules for practice under similar circumstances.

Master J., *ætat.* 2, a twin child, was brought to the author in 1853 perfectly deaf and dumb, being able only to utter a few articulate sounds which he had acquired before he was deaf. His parents were both phthisical; his brother twin could hear perfectly well, and so could he also until he was nine months old, when he had convulsions from dentition, together with an attack of bronchitis; from that period he remained perfectly deaf, being able only to utter imperfectly a few monosyllabic words which had been taught him as an infant. It now appeared that

he had not made any advance on this for the last fifteen months ; at the time the author saw him he was cutting his lower molar and canine teeth. His breathing was short, and the throat was not in a healthy condition, the tonsils being enlarged and the membrane thickened, particularly at the back of the pharynx. The external ear and meatus were normal. The gums were ordered to be scarified freely every two or three days, and blisters to be applied repeatedly behind the ears. Half a grain of calomel with some prepared chalk was ordered to be given every night. In the course of three or four months there was a visible change ; the throat was much better, the tonsils reduced in size, and the hearing much improved. That change continues to this time. He is now three years old, and though still somewhat deaf, he talks nearly as well as the majority of children do at that age.

The author has seen many cases in some points similar to this, and he is anxious to impress upon the practitioner the vast importance of an early and free scarification of the gums, frequently repeated in all cases where deafness arises, or is suspected to exist, during the period of dentition.

The author by no means wishes it to be understood that congenital deaf-dumbness is susceptible of cure, but as there are certain means of distinguishing congenital from non-congenital dumbness, every case should be carefully investigated, and even if the patient be found capable of hearing only the loudest sounds, the case should not be abandoned as absolutely hopeless.

EDUCATION OF THE DEAF AND DUMB.

In those melancholy cases in which the hearing cannot be in any degree restored, it becomes a question how are these unfortunate sufferers to be disposed of ? can anything be done towards educating them and fitting them for any of the purposes of life ? This question scarcely belongs to the *object of this essay*, but, as medical men are often

consulted on the subject, a few observations may not be altogether out of place.

Philanthropic attempts to instruct the deaf are not of very recent origin; the first mention we meet with of the capacity of those born deaf to receive instruction is in the writings of Rodolphus Agricola, of Groningen, born A.D. 1442. He does not inform us who was the parent of the art, but he mentions, in his posthumous work "*De Inventionem Dialecticæ*," that he had himself witnessed a person deaf from infancy, and consequently dumb, who had learned to understand writing, and, as if possessed of speech, was able to note down his own thoughts. Since that period institutions for the instruction of the deaf-mutes have sprung up in every civilised country. There are public establishments for the deaf and dumb in London, Birmingham, Manchester, Liverpool, Exeter, and Doncaster, besides those of Scotland and Ireland. But there is still a deficiency of room, as well as of instruction, and as the dumb cannot complain, little is known of the amount of existing distress. A vacancy in the institution in the Old Kent Road can accommodate but few of the many candidates, and these together only represent a fraction of the whole number of these miserable sufferers, a burden to their friends, and outcasts of society.

The amount of instruction and education imparted to the deaf and dumb by the existing institutions, affords a striking instance of the power of overcoming difficulties attendant on persevering and determined efforts. It appears that the deaf and dumb are naturally equal to other persons in their intellectual powers, and their faculties may be developed by means of artificial language, or by natural or descriptive signs, assisted by writing; that by these and less important auxiliaries, such as dactylology, drawing, and the use of pictures, the mother tongue can be perfectly taught to the deaf and dumb, and thus may be acquired the elements of an ordinary education.

Another primary auxiliary in the education of deaf-mutes is that modification of the language of gesture called

natural signs. In this language the deaf and dumb take great pleasure; if unrestrained, it would be their only mode of communication with each other; and they appear to find in its resources all that is necessary to give life and force to their ideas—the quick changes of countenance which they exhibit, the sparkling eyes, the lighted-up features, the sarcasms, the sensibilities thus expressed; the transitions “from grave to gay, from lively to severe,” all faithfully portrayed in the ever-varying index of their mind, speak at once in favour of this language as the truest mirror of their thoughts, hopes, wishes, and feelings, and inform us that this language is Nature’s most perfect, most expressive interpreter:—to this rude though powerful mode of intercourse, which all the deaf possess in a higher or lower degree, those who are more intelligent add signs of description, by which they are able to explain facts and circumstances which have been brought under their observation. The teacher takes advantage of this method of communication to add to their stores of knowledge, to enrich and extend the sphere of their thoughts, to give them new food for the mental operations, all of which may be accomplished during the time that words and the language of their country are imparted to them. Thus a conventional language is formed which assists in their intellectual culture, increases their happiness, and shows them in some degree the connection which exists between themselves and the objects by which they are surrounded.*

* While these pages were passing through the press, an interesting illustration of the advantages of educating the deaf-mute was recorded in the columns of the “*North Wales Chronicle*.” It appears, that at a meeting held in Denbigh for the establishment of a Deaf and Dumb Asylum for the Principality, Mr. Buckstone, the master of an institution at Swansea, introduced two boys for examination, one of whom had a mother deaf and dumb and also an idiot. Such was his condition that his fellow-parishioners deemed him a fitter object for a lunatic asylum than for an institution where he might be qualified to take his part in society; nevertheless, after passing some time at the Swansea Asylum, the progress he had made was quite satisfactory to the meeting. When commenting on this, Mr. Buckstone unawares confirmed some of the author’s previous statements: he said that “many supposed that in deaf and dumb objects the organs of speech were totally deranged, but by experience it

The noble decree of the King of Denmark is worthy of imitation: "Every deaf and dumb child born in this kingdom shall receive the education necessary to render him a useful member of society." The number of institutions for the deaf in Europe, and some particulars respecting them, would afford valuable information, if truthfully reported. With regard to the capabilities of the deaf and dumb for instruction, and the means by which it may be imparted to them, the following principles are firmly established:—

1. That the deaf and dumb are naturally equal to other persons in their intellectual faculties and manifestations.

2. That these faculties may be developed by means of articulate language, or by natural and descriptive signs, accompanied by writing.

3. That the less important auxiliaries in the instruction of the deaf and dumb are dactylology, writing, drawing, and the use of pictures.

4. That by these means the mother language can be perfectly taught to the deaf and dumb; and

5. That during instruction in language by the above auxiliaries, they may also acquire the elements of an ordinary education.

The suggestions offered in the course of this article for improving and extending the education of the deaf and dumb are as follow. We doubt not but the coöperation of

was found not to be so. They were incapable of speech because they were dead to all sound; but by their system of tuition they were rendered able to hold converse by signs and by writing. Of course some were quicker in acquiring learning than others, but even the dullest had made wonderful progress.

"The necessity for such an asylum in the Principality was shown by a statement as to the number of deaf-mutes born there, *i. e.* 700; and it was remarked that they were more numerous in mountainous countries, especially in Switzerland, than in other parts of Europe. The statistical amount throughout the world was 1 in 1500."

It would prove an important and interesting statistical inquiry to ascertain how far the peculiarities of climate and locality influence the loss of the function of hearing in newly-born infants, for it was distinctly asserted at this meeting that such cases were much more numerous in mountainous countries than elsewhere.

philanthropists, committees, and teachers would, in a very few years, effect all these ameliorations :—

1. That the schools at present in operation in this country are insufficient for the instruction of the number of deaf and dumb persons ascertained to be within the usual ages of education.

2. That the time necessary for the common education of a deaf and dumb person, according to the experience of those best informed on the subject, is not less than six years.

3. That the education of the indigent deaf and dumb should be made imperative on the parishes to which they belong.

4. That some means, by the press or otherwise, are necessary for making known the principles, practice, and experience of the various institutions.

5. That it seems desirable, in order to secure a succession of experienced teachers, that the Government of the country should be solicited to furnish means for augmenting the salaries of second masters in the various institutions.

The following deductions regarding deaf-dumbness may be assumed to be correct ; they are founded not only on facts communicated at the commencement of this article, but in many other documents, the general accuracy of which cannot be doubted :—

1. That deafness is not always hereditary, though it is found in families, and often among collateral relations.

2. That dentition, and the diseases to which infants are liable, are a fertile source of deafness.

3. That the deaf are in many cases subject to other diseases, the principal being those of a scrofulous tendency.

4. That the manufacturing and agricultural portions of this kingdom furnish instances of this calamity in nearly an equal proportion.

5. That a perfect system of registration would tend to furnish a correct census of the deaf and dumb, and would exhibit many facts calculated to throw light on some of the causes of complete deafness.

The existence of deaf-mutism is a question of interest and importance in a medico-legal point of view. The deaf-mute may be admitted as a witness in civil or criminal proceedings, and may also be arraigned at the bar of justice, should he or she have received a certain amount of education, imparted in such a way as has been found by experience to be the best calculated to rouse the comparatively dormant faculties, and to bring the intellect into operation. If the deaf-mute, on the other hand, remain uneducated, has never had his moral sense awakened, nor been taught the ethics of society, and the liability to punishment for evil deeds, &c., then the law holds that he cannot be regarded as competent to give evidence in the courts of justice, nor be liable to be arraigned as a prisoner for crime.

A person born deaf, dumb, and blind is looked upon by the law as in the same state as an idiot, he being supposed to be incapable of any understanding, as wanting all those senses which furnish the human mind with ideas; but if he grow deaf, dumb, and blind, not being born so, he is deemed *non compos mentis*, and the same rule applies to him as to other persons supposed to be lunatics.* Without staying to dwell upon the singular conclusion the learned judge has emitted respecting those who have become deaf, dumb, and blind from disease or accident, that they are to be looked upon as lunatics, the quotation will serve to show the estimation in which those are held who are deprived of a third sense, that of sight. As the power of educating such is very greatly lessened by the additional deprivation, although it be not altogether hopeless, they are described as being in the same category as idiots.

The number of the uneducated deaf and dumb in all countries, as before stated, must be considerable, as the census shows that they bear a large proportion to the total population; the institutions already at work for the teaching these waifs of nature are neither *numerous enough nor rich*

* Blackstone, vol. i.

enough to receive them all, although steps in that direction have been largely taken of late years.

In a case tried at the Old Bailey in 1786, John Ruston, a man deaf and dumb from birth, gave evidence for the prosecution, his sister being sworn interpretress. It appeared that he had not been educated as those suffering under that calamity now are, but that the circumstances of his case had originated a peculiar mode of signs between him and his sister for the conveyance of ideas. His sister said that these arbitrary signs and motions were not significant of letters, syllables, words, or sentences, but were expressive of general propositions and entire conceptions of the mind, and the subjects of their conversations had usually been confined to the domestic concerns and familiar occurrences of life. She believed however that her brother had a perfect knowledge of the tenets of Christianity, and was certain that she could communicate to him true notions of the moral and religious nature of an oath, and of the temporal dangers attending perjury. To this it was objected by the counsel for the defence that, although these modes of conveying intelligence might be capable of impressing the mind with some simple ideas of the existence of a God, and of a future state of rewards and punishments, yet they were utterly incapable of communicating any perfect notions of the vast and complicated system of the Christian religion, and therefore the witness could not with propriety be sworn upon the holy Gospels. The difficulty of arraigning a man for perjury whom the law presumes to be an idiot, and who is consequently incapable of being instructed in the nature of the proceedings against him, was also urged against the admissibility of the evidence. The judge however overruled the objection; received the witness' statement, and the prisoner was convicted, and received sentence of transportation for seven years. His offence was simple grand larceny.*

In Massachusetts, a deaf-mute, charged with larceny,

* Beck on Medical Jurisprudence.

was tried, a friend of his, well acquainted with his mode of talking by signs, having been sworn in as interpreter; but a similar result did not follow the trial of Jean Campbell on the 1st of July, 1807, before the Court of Justiciary in Scotland. She was charged with having destroyed her infant, and her counsel objected to the trial because she had been deaf-mute from infancy, and he could not obtain any information from her so as to guide him in conducting her defence. The counsel for the Crown admitted that the prisoner had been deaf-mute from infancy, but added that she was capable of distinguishing between right and wrong, and was sensible that punishment followed the commission of crime. To prove this, Mr. Kinniburgh, the teacher of the Deaf and Dumb Institution, gave evidence. He stated that she explained the death of her child as an accident, occurring when she was intoxicated. From his communications with her, he thought her a woman of strong powers of mind, and that nothing appeared wanting, humanly speaking, to have saved her from the pitch of depravity she had apparently attained, but some hand to have opened for her the treasures of knowledge at a proper time; he conceived she possessed the power of conscience in a certain degree, and had strong natural affection for her children; she indignantly repudiated the charge of murder. He could not ascertain with certainty whether she understood the ceremony of marriage; but he was satisfied that she was aware that she was to be brought before a court of justice, and he understood that she connected the death of her child with her appearance in court. She was sensible of the criminality of theft, but he could not say anything as to her opinion respecting the abstract crime of murder in general. She had no abstract idea of what a trial is, and he thought she could not plead guilty or not guilty by signs. Dr. Farquharson thought she knew as little of the distinction between right and wrong as an infant six months old. The case being considered a novel one, the judges ordered informations on each side to be prepared and printed. Subsequently, Lord Hermand

expressed his opinion that the prisoner was not a fit subject for trial, she being deaf-mute from infancy, totally uneducated, unable to give instructions to her counsel, or the names of her witnesses, and also to plead to the indictment, except by signs, which he thought was not pleading at all.

The other judges however overruled this opinion, and decided that the panel should be tried, but when brought to the bar, and the indictment read, the question being put, guilty or not guilty, her counsel would not allow her to plead, unless it could be explained to her that she was at liberty to plead guilty or not. As this could not be done, the case was dropped, and she was dismissed from the bar *simpliciter*. Thus, though it is established that a deaf-mute is *doli capax*, no means have been discovered for bringing him to trial.

In a subsequent case, before the High Court of Justiciary, when a prisoner was charged with a rape on a deaf-mute, trial could not be had, because the prosecutrix could not take an oath, although it was shown she had a perfect idea of the existence of a Supreme Being and of a future state, and though she might be convinced of the obligation of speaking the truth.

In civil matters however more licence is shown ; the deaf-mute may obtain possession of real estate, he being legally entitled to it, if he show sufficient understanding. In 1754, a female thus afflicted, being of age, applied to Lord Hardwicke, the then Lord Chancellor, for that purpose, and having given sensible answers to certain questions put by him in writing, a decree was given as desired by her. The code of Justinian was not in favour of these unhappy persons ; it appears to have considered them as incapable of instruction, and unworthy of civil rights, as it declares they shall not have the power to make any will or disposition of property, or to free a slave.

Under certain circumstances individuals have been found who have undertaken the very arduous task of feigning deaf-mutism. The peculiar expression of countenance and certain gestures which distinguish the real deaf-mute

are very difficult to assume, and still more to maintain and constantly present during repeated examinations. This consequently will afford an excellent means of diagnosis. A Frenchman, who feigned to be thus afflicted, was detected by Sicard, after he had successfully defeated the closest investigations in France, Germany, Switzerland, Spain, and Italy for four years. He was found out by means of his writing, inasmuch as he spelled by *sound*, and not by *sight* as the deaf-mute would. The following extracts will serve as a specimen:—"Je jur de vandieux; ma mer et nê en Nautriche; quhonduit (for *conduit*); essepoise (for *espoir*); torre (for *tort*); ru S. Honoret; Jai tas present (for *J'étais présent*); jean porte en core les marque (for *J'en porte encore les marques*)."

Beck says, if the tongue retain its muscular power, the person pretending to be dumb is doubtless an impostor. Orfila recommends that they should be made to sneeze, and the sonorousness of the sound noticed. Fodéré observes that to detect pretended deaf-mutism, something deeply interesting to the person should be said in his presence, and the effect produced on the countenance carefully noted. In this way Sir Walter Scott causes the detection of Fenella, the impostor, in Peveril of the Peak.

OF THE EAR IN HEALTH.

It is not always easy to discover whether the organ of hearing is in a perfectly healthy condition; but it is important nevertheless to be aware of the first approaches of disease; and for this reason the following observations on the natural conditions and functions of the ear may not be out of place.

In the first place, it must be remembered that the sense of hearing, like that of seeing, is double, and the organs of each sense being double likewise, and each communicating a precisely similar sensation, it is just possible that *on one side* the power of hearing may be considerably im-

paired or even destroyed, yet, so long as the sense is perfect on the other, the patient may not be aware of his infirmity. In like manner the sight of one eye has been known to be entirely lost for months, and even years, without the patient being at all aware of it, the other eye being perfect. More usually however the defect in the ear is soon discovered, its position in the head serving to reveal the infirmity. It is more common indeed for both ears to become in some degree defective without the patient or even his friends discovering it, than for one ear to be unconsciously deaf, the other being sound. Whenever, as often happens in advanced age, the power of hearing becomes gradually defective, so insensibly does the defect steal over the patient that the friends are often the first to discover it; even if the patient be fully conscious of it, he is not always ready to admit its existence. In these cases it is obvious that it is extremely difficult for the surgeon, when he is consulted, to ascertain the exact date of the disorder. A similar difficulty exists to even a greater degree in the case of young children, in whom the fact that absolute deafness has occurred, is never ascertained until long after it has actually existed.

Even in a healthy condition of the ear and its nerves, there exists in different individuals, and sometimes in the same individual at different ages, a considerable variation in the hearing distance. The average distance within which the tick of an ordinary watch may be heard by the healthy ear varies from twenty to twenty-five feet; but this supposes a closed room and perfect silence, the shape, size, and furniture of the room being all of them calculated to convey sound with moderate and average facility. But so much variety exists in these extraneous circumstances, that a comparison of the hearing distance of the patient with that of an individual known to be healthy, at the same time and place, is a better test than merely measuring the distance.

There are many circumstances which may conduce to establish a great variety of the hearing power in different

healthy individuals; such as the form of the auricle, the growth of hair in the meatus, its natural degree of dryness or moisture, the size, shape, and curves of the canal, the natural thickness of the membranous portion of the tympanum, and the degree of sensitiveness and impressibility of the nervous system generally. The latter especially may be supposed to account in a great measure for the obtuseness of hearing so common in the rustic peasantry. The defect in them is probably partaken of by other portions of the nervous economy, and in the ear becomes more obvious from the want of culture and attention.

Among other variations in the faculty of hearing in a sound state of the organ, may be mentioned the power of distinguishing musical sounds, which not only exists in very different degrees in different individuals, but some who nevertheless can hear the faintest sounds, such as the tick of a watch at a distance, have no power of distinguishing one melody or musical tone from another. It is even possible for a person whose hearing is very defective from disease, to have a better ear for musical sounds than has another person who is not at all deaf. The faculty of distinguishing to a nicety the number of vibrations per second in a musical tone, or in other words an ear for music, although capable of improvement by cultivation, is in many individuals a natural gift, and may often be traced to one or both parents; whole families are either similarly gifted, or, on the contrary, as often happens, all nearly destitute of the musical faculty. The national cultivation or neglect of this high endowment, and the consequences to posterity in either case, would form a curious and instructive subject for investigation. The musical faculty so clearly partakes of peculiarities of time and place, sometimes becoming the privilege of a nation or a district for a generation or two only, that when it is deficient in a nation or family, it is probable the defect may have arisen from the total neglect of the faculty, which is sometimes allowed in individuals and families to lie dormant for generations, even in the very age and country wherein musical science is highly culti-

vated ; whereas the singing faculty is practised and in some degree cultivated and improved even among the uncivilised races who are wholly ignorant of music as a science. The faculty of distinguishing colours might probably suffer a similar fate, if the study of colours were as much neglected as the study of tones. On the same principle the quickness of perception with regard to all sounds, those especially which are faint or distant, is much improved by exercise and culture, and on the other hand deteriorated by inattention and neglect. That one-half of the deafness which exists is the result of inattention, cannot be doubted :—

Fal. Very well, my lord, very well ; rather, an't please you, it is the disease of not listening, the malady of not marking, that I am troubled withal.—
King Henry IV., Second Part.

The ear in health therefore is by no means always what it ought to be. In its highest states of cultivation it is capable of conveying sensations and even sentiments of the most exalted pleasure, whereas by neglect the musical faculty may in the course of a few generations be apparently lost. Even then it may be restored by assiduous and persevering cultivation. It is the opinion of Mr. Wilde that one of the first symptoms of deafness is often found to be an incapacity of distinguishing *octaves*. This however is a failure of the musical faculty rather than of the power of hearing, and it may exist either with or without partial deafness. Musical persons though partially deaf can distinguish octaves as well as tones and semi-tones. When a tone is mistaken for its octave, it is usually owing to a peculiarity in what is called the *quality* of the tone, a subject not within the scope of this work to discuss.

Some persons imagine that they are suffering under some defect in the organ of hearing, because they cannot always distinguish the direction of some noise which they hear within a few feet of them. This however is an universal complaint. The defect is limited to a definite distance, and is explicable by the laws of acoustics.

In old age the hearing, in common with the sight and

other senses, is liable to become obtuse ; but deafness is by no means a necessary and invariable infirmity of advanced years. Some persons hear very well in extreme old age, and others would do so also but for some morbid accumulation or other removable malady. The cause of senile deafness should therefore be inquired into in every case, the more especially as there is no alteration of structure apparent in the ears of aged persons analogous to the change in the focal distance of the lens of the aged eye. The deafness of the aged sometimes consists simply of mental infirmity and decrepitude, and a consequent slowness and difficulty in receiving ideas through whatsoever medium they may be conveyed. The structure of the aural apparatus is perfect, but the brain is enfeebled in its functions, and its agents are slow in conveying to the mind the impulses received from the extremities of the sentient nerves. The appointed time is drawing near when the outer world shall be altogether hidden from the conscious spirit.

The *prevention of deafness*, or the best mode of preserving a healthy condition of the organs concerned in audition, is a question of great interest, especially with persons in whom it may be surmised that there is some hereditary tendency to deafness. Certainly there is no specific preventive of deafness, no means of strengthening the healthy organ by local applications or otherwise. But yet something may be done, and wisely, with a view to avert so great an affliction as deafness in advanced years, as well as to prevent those acute forms of inflammation which attack patients at all ages. These preventive measures may be regarded as of three kinds.

1. Avoid the obvious causes of inflammation of the ear and of the throat ; especially exposure to wet, or to a cold draught of air blowing upon the side of the neck or ear. In cleansing the ear by ordinary ablution (a very necessary daily practice), violence should be carefully avoided. *Ear-picks* are barbarous tools in careless hands, and often inflict *injury*. Persons liable to attacks of deafness, ear-ache, or

those neglected discharges described in this book, should be especially regardful of these precautions: they would do well to endeavour to get rid of these infirmities in early life if possible, by adopting such measures as may be suggested by their medical adviser.

2. Attention to the general health is very necessary, as a preventive of local disease. Temperance and moderation, air and exercise, and all things which contribute to preserve the "*mens sana in corpore sano*," will have a tendency to protect the ear as well as other organs from the invasion of disease: individuals of a gouty or rheumatic tendency should remember that few organs suffer more severely from these forms of disease than the ear and its appendages. Restricted diet for the gouty, and warm clothing for the rheumatic, may be taken as the type of the preventive measures they should put into requisition.

It is unnecessary here to repeat the various causes of deafness in infancy especially, and the precautions introduced under the several heads of this treatise, relative to each particular source or origin of disease. Whatever conduces in each case to promote the general health, must have its influence in preventing organic mischief in the ear, and consequent impairment of its functions.

3. As deafness may originate from, or be aggravated by, an obtuseness in the sensibility of the nerves of the labyrinth independent of disease, it is worthy of consideration whether in the case of persons hereditarily disposed to senile deafness, a high state of cultivation of the faculty of hearing would not tend to defer, if not to prevent, the imperfection of the sense in old age. Beethoven, it is true, was deaf, and is said to have composed some of his grandest symphonies after total deafness had seized him, the result probably of organic disease. But, with this exception, it is rare for musicians to become deaf; the extraordinary perfection and acuteness of hearing often attained by the blind, proves that the faculty of hearing, like all the other physical powers of the human frame, is capable of high development and protracted vigour

under diligent cultivation ; at the same time it is subject to decay and decrepitude as the penalty of neglect.

EAR-TRUMPETS.

There never was and never will be invented an apparatus better adapted to collect sound from every direction than the human auricle ; but much may be done to collect the vibrations which issue from one direction only, excluding the rest ; this is the design of all ear-trumpets. In certain cases of incurable imperfection of hearing, the ear-trumpet is a very convenient and useful instrument ; but, like spectacles indiscreetly chosen or improperly used, these instruments may be useless or even mischievous.

Where the membrana tympani is pervious, and the middle ear partially destroyed, and also in cases of incomplete nervous deafness, an ear-trumpet of the simplest construction with a well-expanded mouth, used occasionally only, is a very desirable contrivance. But where the membrane is thickened, or the deafness is complete, it will be perfectly useless.

These instruments are of various kinds and shapes, and are found to supply many opportunities for serving the cupidity of instrument makers ; but the simple tin trumpet, which may be purchased for half-a-crown or less, is quite as useful as the most costly. The double ear-cornets are in some cases useful, but they are generally objected to on account of their unsightly appearance. Instruments of a low degree of power should be chosen at first, and should by no means be habitually used. Those very small instruments, advertised as fitting into the meatus, and capable of being concealed from view by the cap, bonnet, or hair, obtain their quality of invisibility at the expense of their utility, for they are quite unfit for the purpose for which they are professedly sold ; nay more, their presence in the meatus, as foreign bodies, may act as a source of irritation, and *relight up* an inflammatory action, scarcely yet perhaps, or

but just subdued Should such a result ensue, an obstinate otorrhœa would follow, and the sufferer would have reason to rue the use of the invisible instrument, even if the inflammation did not extend to the middle and internal ears, and cause the serious mischiefs described in a previous part of this work, in the sections on otitis, etc.

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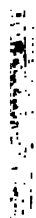
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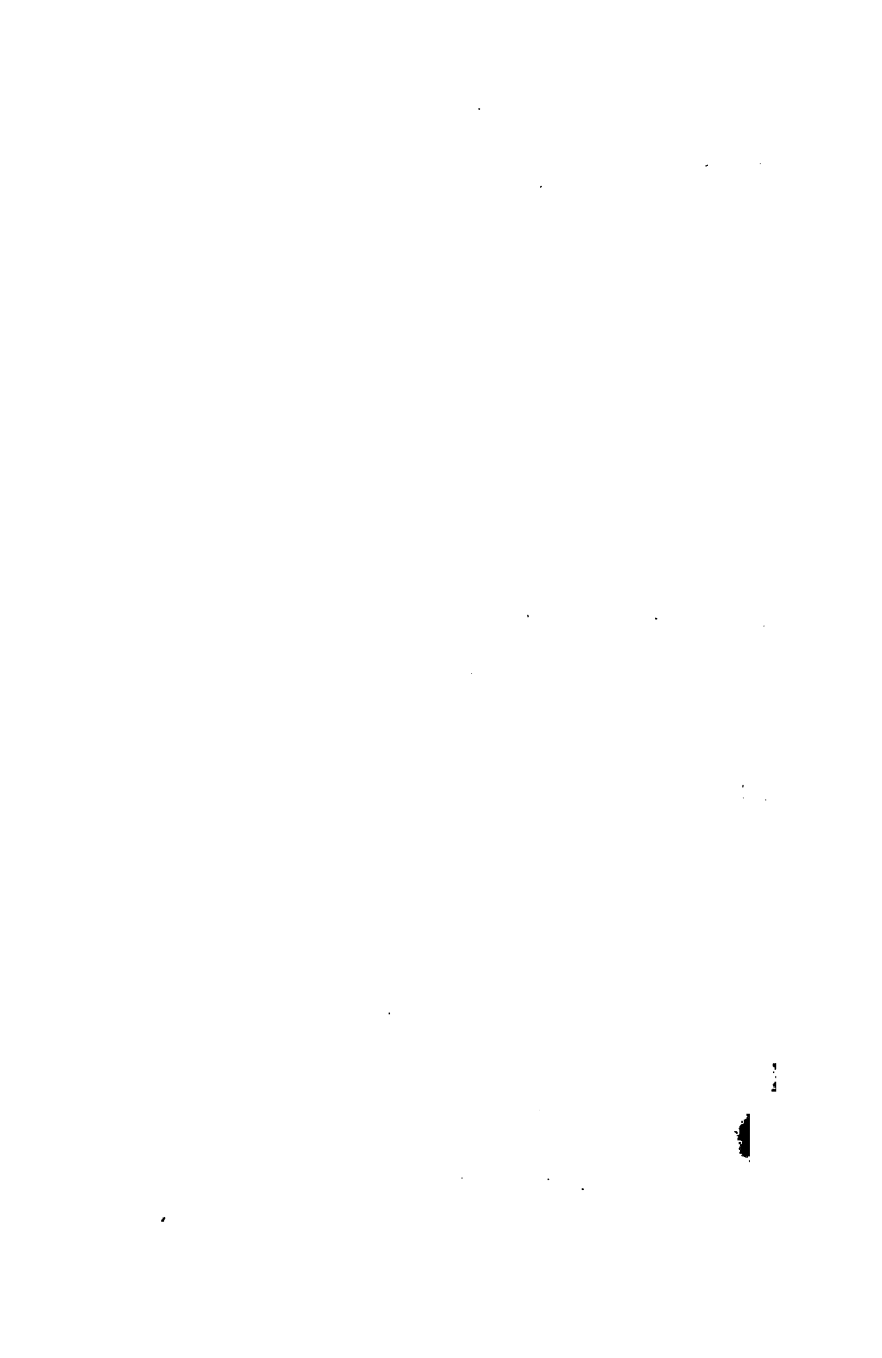
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